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1st REPORT

SELECT COMMITTEE ON  
SCIENCE AND TECHNOLOGY

INNOVATION IN  
MANUFACTURING INDUSTRY

VOLUME II—ORAL EVIDENCE

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*Ordered to be printed 29th January 1991*

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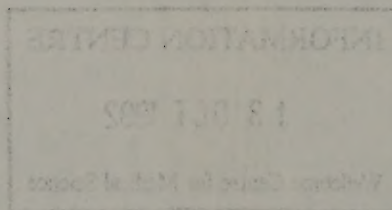
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MINUTES OF EVIDENCE

TAKEN BEFORE THE SELECT COMMITTEE

ON SCIENCE AND TECHNOLOGY (SUB-COMMITTEE II)

MINUTES OF EVIDENCE

TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE

AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 7 March 1990

PA CONSULTING

Mr J Puttick, Mr T Roberts and Dr K Ridler

Ordered to be printed pursuant to the Order of The House of Lords of  
30th November 1989

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# MINUTES OF EVIDENCE

TAKEN BEFORE THE SELECT COMMITTEE  
ON SCIENCE AND TECHNOLOGY (SUB-COMMITTEE I)

WEDNESDAY 7 MARCH 1990

Present:

Butterworth, L.	Taylor of Gryfe, L.
Flowers, L.	Vinson, L.
Gregson, L.	Whaddon, L.
Kearton, L.	

In the absence of the Chairman, the Lord Flowers took the Chair.

## Examination of Witnesses

MR JOHN PUTTICK, Chief Executive, Manufacturing and Logistics, MR TONY ROBERTS, Business Development and Marketing for Manufacturing, and DR KEITH RIDLER, Chief Executive, Technology, PA Consulting, called in and examined.

*Chairman*

1. Thank you very much for joining us. We are experiencing the usual frisson of our first group of witnesses today, getting down to business properly, and I am sure it will be a very interesting day. Lord Caldecote has asked me to express his profuse apologies to you. I am going to do my best to stand in for him but he had a long standing engagement that he could not get out of otherwise he would have been here today. May I emphasise what it is we are trying to do in this inquiry. There have been many studies of innovation done in the past, including things we have studied ourselves, and we do not want to repeat all of that. What we are concerned about today is something we at least as a Select Committee have not done before which is to study boardroom attitudes to innovation and the extent to which activities in the boardroom or decisions taken in the boardroom, or attitudes shown in the boardroom, influence the way firms do or do not succeed in innovation. We are concentrating on that rather than the technical process of what goes on at the lab bench or whatever. With that brief introduction may I invite you to introduce your colleagues and then to say any words of general introduction you wish, or your colleagues if they wish.

(*Mr Puttick*) Thank you, Chairman. Like yourself, we saw this meeting as a perhaps introductory, preparatory meeting and we were very enthusiastic to respond to your request because I think our company as a whole, and particularly the three of us as individuals, are very much involved in this area and very enthusiastic to put our emotions on the table as well to do something to help resurrect British industry. I am John Puttick, I am the Chief Executive running the manufacturing consultancy practice of the PA Consulting Group. My responsibility is specifically for the United Kingdom and Western Europe but I also have a dotted line responsibility, if I can put it that way, for our work around the world. On my right is Tony Roberts who works with me very much in business development and marketing, if you like our own innovation role

of understanding particularly issues manufacturing industry faces, helping us to develop our own services for that. He has been specifically involved in working with the DTI recently and other things which we felt were very relevant today. On my left is Dr Keith Ridler, the Chief Executive of our technology consulting practice, which you may know of, based near Cambridge, who are very much in the business of innovation, both product and process, for our clients. The business application of technology and so on is very much his practice. We thought we would each of us just introduce ourselves for no more than five minutes to set the scene where we come from. We have not attempted at this stage to submit written evidence although we have brought copies of recent reports which are all very relevant to the subject. There is a lot of material in there that could be relevant. We will comment on it perhaps in discussion. Equally we have not tried specifically to answer quite the questions that you tabled to us but I think many of the things we will talk about should cover those. Perhaps you can guide us but if as a result of this you want us to more formally present answers to specific points you are interested in we can do that.

2. That will suit us very well. If you could take our questions as the general background and deal with them how you wish and then we may ask you specific points later.

(*Mr Puttick*) Perhaps we can open our discussion and we will be very happy to comment on anything we can. If it is an area we do not feel authoritative on we will say so. Perhaps to say where we are generally, and me specifically, where we come from, we are driven by a growing and very serious concern about the decline of manufacturing in the UK, particularly as seen in the balance of payments. There are two points on that one: first, there is a view that is sometimes expressed that the negative balance is explained by British imports of capital plant to re-equip British industry but we believe that is not so. Our analysis of figures tends to confirm that is not the explanation of the negative balance of payments in the manufacturing sector. That it is very



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MR JOHN PUTTICK, MR T ROBERTS  
and DR K RIDLER

[Continued

[Chairman Contd]

much to do with our failure in the durables sector such as cars, white goods, brown goods and so on, where typically British companies do not produce products of quality and attractiveness in the market place that encourage people in the market place to buy them and, therefore, British people buy imports. Indeed, that view is confirmed by the numbers, in fact one of the reports we will leave with you looks at how R&D money was spent around the world, one of the countries being the UK, tends to confirm that. It showed that in Britain there was a strong emphasis on spending R&D and innovation into the manufacturing process rather than the product, and British companies were still attempting to gain a competitive advantage by improving processes at the expense of spending effort on their products. The figures and percentages quoted were almost the inverse of Germany and Japan. We believe the explanation of that is that Germany and Japan have now got their manufacturing processes to what they believe is a very satisfactory stage, in other words they deliver 100% quality at service levels and costs which are competitive and are now putting their effort into getting the product right. It is certainly one of my beliefs that the old adage about the best mousetrap is very true and lots of British companies have forgotten it. One of the nuggets to put into this conversation is the need to remember that the product is a very vital part of the business. Taking that enthusiasm I and PA are working on a project. I am leading a particular project and working on an initiative led by Mr Ivan Yates of British Aerospace and with PA we are putting time and effort jointly into this. The basis of Ivan's mission, if you like, is that the manufacturing industry does matter and in some of the discussions we have we still find the view that the manufacturing industry does not matter and we can live off services. However much we discuss this and show numbers there still seems to be a body of opinion that does not understand that. One of the objectives of his work and our work is to try and get an understanding and acceptance of those basic economic facts. Leading on from that there are four projects now running under that umbrella. One is to confirm that basic economic equation and to understand how the issues impact on it. Secondly, one of the sub-committees of that project is looking at the City and the dreaded issue of short termism which, again, I would table certainly from our experience and perhaps the most value we can bring to your Committee is our experience in boardrooms. Certainly, most of our chief executive clients, when asked what their problems are, first of all state having to look over their shoulders at the analysts who are going to comment unfavourably on their performance because they are investing in the long term view. I personally believe that is a very genuine reason for difficulty and that it is not, as some economists I talk to believe, just a financial excuse for British manufacturing industry to hide behind. The third working party is looking at resources, training and so on and the fourth, which I lead, is looking at what manufacturing can do for itself,

despite the things in the water, if you like, which do not encourage manufacturing industry, nevertheless we do have some successful manufacturing companies which are world players. We do not have enough but we do have some and therefore we are trying to look at the characteristics of those companies and see what it is about them. I think it is perhaps worth making really the third point and adding to the two I have already made—the short termism and the emphasis on product—the one on leadership. I think one can list the companies that would be generally accepted as world players or world class manufacturers, whichever piece of current jargon you like to use, and identifying the clear leader and individual who has the drive, the vision, to succeed despite the short termism, despite the interest rates, despite the economic fluctuations and so on. I had a very good example yesterday when I heard a presentation by Tony Gilroy who until recently was the Managing Director of Land Rover who was describing how they launched the new Discovery, their new product. I thought it was a splendid example of managing, innovating, getting a new product into the marketplace in 27 months which shows Britain can make a product in this consumer durable sector which typically we do not seem to be successful at. With the right drive and team work and other aspects, that my colleagues will bring into the discussion, you can be a world class player. I think that perhaps positions me and some of our broader view interests and I think the three nuggets I would put in to explore from the boardroom are the importance of leadership; the ability to handle short termism and the real emphasis on the product.

(Dr Ridler) My part of PA, as John has already indicated, is the part of the organisation that is concerned with managing innovation and undertaking innovation on behalf of our clients. Managing innovation is our daily task. What I would like to do is talk briefly about the culture and the environment in which that management activity has to take place. Taking up your introductory point, I think all of these things are very much under the control of the boardroom. Firstly I would like to question the definition of innovation that you have provided. Ours is a little bit different. There are a lot of similarities as well. PA's definition of innovation is "the creative assembly of existing science and technology to meet a need". That is differentiated from invention in much the same way as you have differentiated innovation from invention. Our definition of invention is similar to that for innovation, but without the need being identified or defined. Perhaps it is also worth defining technology because it is a word which crops up in this discussion very very frequently. Our definition is "the application of science through engineering and design to create commercial benefit". Again I think it is not very different from the thoughts you have had. If we could come back to the definition of innovation. Your definition reads "innovation is the



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and DR K RIDLER

[Continued

[Chairman Contd]

economically significant application of new knowledge and techniques" and the word I question in that is "new". You will recall from our definition I used the words "existing science and technology". I think innovation is using existing knowledge but in new ways, that is where the newness comes in. Further, and perhaps repeating the point, if we talk about invention and innovation in the commercial environment, the likelihood of the sale of an invention which does not match a need in the market place or in the company in which it has originated is low, whereas the likelihood of the sale of an innovation is high. It is all about meeting the commercial requirements. If we go then to the culture and the environment within companies and within organisations like our own, there are five major points I would like to touch on. They are all manageable. The first one is the need for teams, teams of people to innovate. The day of the lone innovator - James Watt, Barnes Wallis, and Brunel —is sadly gone. Technology and engineering is far too complicated for any individual to be able to handle it all on his own. We need to have teams, and more particularly, we need to have broad teams and we need to have those teams contain techniques or disciplines beyond, or substantially beyond, those which at first sight may seem obvious to the particular problem or opportunity. That is often where the creative spark comes from. In putting those teams together we need the right individuals, this is my second point, and we describe those individuals as (and aim to recruit) T-shaped individuals. What do I mean by T-shaped individuals? I am describing people where the leg of the "T" is probably their specialism, their technical speciality, which may well be deep. But the cross of the "T" is their breadth, their ability to comprehend and to communicate with people in disciplines and techniques beyond their own. We aim to end up with a set of "T"s with their cross pieces overlapping and that is how you can bring the synergistic effect of all those deep disciplines of these people together to provide something greater than the sum of the individual parts. My third point is that innovation does not flourish effectively in hierarchical or divisional organisations, that is something the boardroom has control over. It is really about communication, both sideways and vertically. In a divisionalised organisation you may well get the classic problem where a product does not work when it goes into production. The design department say that they designed it okay but it is not being made properly and the manufacturing department say: "We are making it right, you designed it wrongly". There are split responsibilities. Things are posted over walls. Things, as a result, drop down cracks. Then there is the communication which is vertical communication between senior management and those undertaking the actual innovation lower down. That brings me to really the fourth point which relates to the commitment and the involvement of the most senior people in an organisation. For successful innovation it is essential

that there is the commitment, certainly at board level, preferably at chief executive officer level as well. Split or diffuse management of innovation in a company or management of innovation delegated too far down the chain is a recipe for high costs and low yields. I think a fairly salutary point which occurs in the R&D survey which John has referred to —which was a survey we undertook last year with the UK as one country but including Japan and several other European countries— was the view on how important the management of R&D was considered by the companies in those various countries. In Japan 57% of the companies contacted and interviewed have a special board member responsible for technology or R&D. Germany was a fairly distant second with 33% and Britain came along with 21%. Rather more worrying than that 21% is the fact that if you then excluded other likely candidates who might take on that responsibility on the board like the managing director, the manufacturing director, the board as a whole, or a sub-committee of the board, we ended up with 22% of British companies putting the responsibility for innovation and technology strategy on "other". Who "other" is I do not know but it is certainly much too far down the chain. My final point relates to constraint. Innovation is usually believed to flourish in conditions of great freedom but this is not true, creativity flourishes under conditions of constraint. If you provide absolute freedom this spreads effort a molecule thick over the whole of the universe and achieves precisely nothing. You need constraint to focus people's minds. The don'ts are often more important than the dos. Constraint is important. If you do not have it you can worthlessly dissipate effort. The peak effort, the right kind of peak effort, needs senior management commitment and involvement. And constraints on things that are within the control of the boardroom are very important in the successful management of innovation.

(Mr Roberts) I think, for the purposes of this afternoon, I have three axes to grind.

### 3. There are plenty more on offer.

(Mr Roberts) The first is closeness of customers and suppliers, the whole culture change needed in the innovation process and skills in general. Those three things are all covered in various ways in the two major documents we have produced for the DTI, one is called "Materials Matter" which is part of a complete programme about technology sources and knowing about available materials, and the other is called "Manufacturing into the Late 1990s" which is about all the external pressures of business and how companies should formulate a complete approach to manufacturing to make the innovation processes work. We will offer those documents and certain sections of them are probably a useful contribution to your process. If I can get back to my three axes, the first of those, closeness to customers, in our experience all too few companies in Britain



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and DR K RIDLER

[Continued

[Chairman Contd]

really deeply understand, or even set out to deeply understand, what it is their customers really need, how do they really add value to their customers. All too many tend to think in terms of "We make this sort of product, this is what we want to make, let us now try and sell it", almost to an unsuspecting marketplace. In a world where in the 1990s customer requirements are getting more and more sophisticated we all want products that are increasingly closer to our personal needs and each of those are slightly different. For example, let me just talk about where technology has got to in brushing our teeth. A toothpaste is not just an abrasive powder, it has fluoride in it, mouth wash, a plaque control, you can probably buy it in a dispenser that meters out the right amount. You can brush your teeth with various sizes and shapes of toothbrush, with various angles of head, bristles of various thickness, size, shape and profile. The whole application of technology means that even something as mundane as brushing your teeth is becoming more complex and customer oriented. You can even do it with a battery operated device if you prefer not to do it. All manufacturing businesses are posing the application of wider choice to their customers and more technology, so the process is more difficult to manage; all the more reason they should deeply understand what it is that adds value to their customers. That is the thing they should concentrate their innovation efforts on. Equally, it provides a steer for them where they should get other people, suppliers, outside the business to concentrate innovation efforts on things important but not so close to the core of their value added requirements so it shapes how they build relationships with suppliers. There is a great deal talked about closeness to suppliers and very little done about it. A buying department is not the right way to shape a close relationship with a supplier, it is a board level fundamental thing, and companies increasingly have to be close to each other. One of the difficulties is if you are putting out significant tranches of your technology to a supplier it is likely that supplier could be, or become, a competitor because he is controlling some of the technologies you need. That is very problematic in an environment where in the UK it is easy to take over companies because of short-termism or lack of defensiveness to acquisition. A recent study we did internally showed it is difficult to take over companies in Germany or parts of Europe, an aggressive takeover is not something easily achieved: if the company on the receiving end does not want to be taken over it will not happen. Those are all things to do with the closeness of suppliers and customers. If we move on to the culture view it is about new products faster and expressions like parallel engineering, multi-discipline teams, teams of designers, production engineers, all getting together. There is a growing recognition that is what is still needed but there is little knowledge and experience of how to make that work. We were talking to some of the design guys from Ford recently and they said: "We have put them all in a room and they still do not

talk to each other, they do not have a common language or a shared purpose". That is about changing almost the rules and values they have as a shared team about new innovations, particularly about putting in new products faster. One of the things that appears to be fundamental about putting in new products faster is best covered by a piece of jargon used a lot nowadays and that is "right first time". That is about deeply understanding what the customer wants, really fully specifying the process and fully understanding the effects of the product with the way it is made and spending a lot more time on brain power and thinking at the front end of the design process. Any management trials and short-termism will cause us to say: "We are 20 months or half a year behind". We must move on instead saying: "Let us stop and take another three months and get it right because we know, and understand, and believe when we do that the product will be right first time, it will be the product the customer wants". Too often you see examples in the UK of products launched on you and I to find out if they were right to launch but on investigation they did not understand what was expected of them, so more "right first time" process is needed. This is a major culture change for UK businesses to achieve. My last axe is about skills and resources in general. I am sure you are all very familiar with the demographic timebomb and its impact: 25% fewer school leavers by the middle 1990s than there were in 1985 for all of us to get at, 15% fewer graduates by the end of the 1990s after a peak in 1992. That is bad enough but if you couple that with the attractiveness of manufacturing industry in general, about 10 years ago something like 90% of science and technology graduates did go into manufacturing industry but now that is down to 70%. So, there is a whole system of creating a particularly attractive environment which appeals to innovators and designers in which to apply their creativity. I guess the other thing we ought to say, by way of conclusion, is all of these things tie together. There is also a *raison d'être* which seems to flow through all this which is if we mean it we need to put together a complete infrastructure which supports business, encourages innovation and that somehow, we feel, is a little bit vague to say the least.

4. Thank you very much indeed. You have, between you, thrown out about a dozen or so important notions for us to talk about. I think it would help, certainly me, if you could give a few examples of particular firms which with particular products showed the sort of initiative and innovatory tendencies at boardroom level and elsewhere which you particularly approve of.

(Mr Puttick) Let me, while my colleagues are thinking, amplify the one I raised about Land Rover because I think there was an example of a company where I think we all know their product (the Range Rover and the Land Rover) which has been a market leader for a long time and has effectively resisted the



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[Continued

[Chairman Contd]

attack by the Japanese and the Germans. Mercedes have a competing vehicle and so do the Japanese. I think the Land Rover management, under Tony Gilroy, recognised they had to bring in a new product, they had lived on those two old products for a long time. They had to bring in a new product. The first thing they did, as Tony has made the point, they took a lot of time to really understand what the market wanted: an off the road heavy type vehicle aimed perhaps at the farming community and so on. Of course, they quickly recognised that in fact the majority of those products are not being bought by farmers, they are not driven off the road and they do not tow things. In fact, 70% of Range Rovers are owned and driven by women was one of their findings. There is an image of the vehicle which helps to sell it. So, they recognised, for instance, and this is rather nice to find, here is a vehicle, the fact it is British made is actually a very important feature. I believe if you go to any shoot or hunt, that sort of event, you will not see a Shogun or a Japanese vehicle there, you will only see a Range Rover there, that is something maybe a few other companies could enjoy. I tell the story to make the point Land Rover took a lot of trouble to really understand why people purchased that vehicle. They brought in Conran to do the internal design of the vehicle but in the end it was done by Land Rover stylists but by picking up ideas from outside their industry.

*Lord Butterworth*

5. Could I ask you on that particular example: in your analysis you used two sentences one was "they took a lot of trouble to find out what the market wanted" and the other was "why people purchased that vehicle".

*(Mr Puttick)* Right.

6. Those seem to me to be two separate and different things. What I would like to put to you is what the market wanted in Britain was four wheel drive applied to an ordinary car. More and more people want four wheel drive. You cannot get it, you have to go and buy a Japanese car. Why did Rover fail to transfer their splendid technology of the four wheel drive and put it in the ordinary car?

*(Mr Puttick)* I think you are addressing another market there. It is a very good point. Obviously there is, as we all know, a growing market for four wheel drive in a conventional car but Land Rover, I think, with their resources were looking to—constrained perhaps—a fairly small volume product. In this particular niche of the market (that brings in this niche concept which I think is very important to Britain) they were looking for a vehicle which had the macho image and had the style of a chunky off the road type vehicle. It is a different niche they decided to go for. It is a very good question: "Why the Rover Group, in the wider sense, should not apply four wheel drive to their other cars in the way Audi and others have done successfully".

7. We are talking about innovation to capture the market.

*(Mr Puttick)* Right.

8. You agree there is an important market there and now more and more British people are buying Japanese cars because there is not a four wheel drive ordinary car offered by British manufacturers.

*(Mr Puttick)* If I can pull another point out in answer to your observation. If you like, the engineer perhaps—I am an engineer, all of us at this end of the table are engineers—would say: "Actually the public does not need a four wheel drive car, it is only a fashion to have one and therefore let us not be silly and give them one" whereas the Japanese and Audi say: "If that is what they want, it is a new product, it is new technology, it has got something different and people will buy it". It is engineering arrogance. I would find it very difficult to justify any real benefit in a four wheel drive car, some benefit, but it does not justify the cost and complexity.

9. What Land Rover were saying was: "We sell a quasi military vehicle"?

*(Mr Puttick)* Yes.

Lord Gregson] If you live 1000 feet in the Pennines you need a four wheel drive car.

Lord Butterworth] Or in the Cotswolds.

*Lord Gregson*

10. I would like to develop this question of the development of the Discovery. One has to remember, of course, when the Discovery was developed it was developed by an organisation who had one single supportive shareholder.

*(Mr Puttick)* Yes.

11. The development was paid for by the taxpayer. Since then, in the transfer of the company to British Aerospace, that development cost has been written off at the expense of the taxpayer so it is a very remarkable situation we have. Now, the OTA—the American Office of Technology Assessment—have just produced a report at the request of the US Congress and that report says the Americans are dropping so far behind in product range there is no way American industry can catch up without government assistance. Since we are about 20 times further back than the Americans in our impoverished product range is there any way British industry can catch up without government assistance?

*(Mr Puttick)* This is a very important point you raise. A personal view, and maybe PA view is certainly the industry needs assistance where market forces do not work.

12. Market forces are driving them down out of the product?



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MR JOHN PUTTICK, MR T ROBERTS  
and DR K RIDLER

[Continued

[Lord Gregson Contd]

(Mr Puttick) That is right.

13. They are anti.

(Mr Puttick) Yes; certainly my view is in favour of some degree of assistance, short of massive intervention. I very much take your point about one shareholder. I only discovered quite recently BMW has been under the control of one family for the last nineteen or twenty years. I think that is very significant.

14. Mercedes have an Article of Association that no shareholder can own more than 15% of the shares.

(Mr Puttick) Right.

15. They have the perfect poison pill.

(Mr Puttick) That is right.

Lord Gregson] The perfect cast iron pill.

Lord Vinson] You say it is market forces but markets are conditioned to a large extent by Government interference. The problem is we have created a tax exemption level for institutions so that savings' flows are increasingly going through institutions rather than first hand because it is more tax effective to do so. The result is that now 30 fund managers effectively control over half of the quoted companies on the Stock Exchange. That is a consequence of an institutional tax privilege which has concentrated ownership and is done, as so many things in life are, for the best possible reason: to develop tax exempt pension funds for our retirement. In practice, of course, it is destroying the foundation of wealth which comes back to the question of short-termism you raised. I want to challenge the fact that it is market forces, it is a disturbance caused by market forces. We can meet it in two ways, either by good civil servants backing technology, which we know is not effective because we have a culture block in this country, or by further investment. From the education point of view we are too tightly disciplined in our education to span the breadth of really good innovatory needs. The tackling of this problem is much easier than the investment. It seems to me the straight answer of Government intervention might work in some cities but it is treating the symptoms rather than the cause. The cause is an over-concentration of wealth with too few hands on the pressures of wealth. You and I would behave in exactly the same way if we were in charge of those funds. Unless we move the pressures and broaden the base we will not be tackling the cause, we will be tackling the symptoms.

Lord Kearton

16. All the technical correspondents agree that Discovery is a remarkable achievement, it is ahead of its field in specification and performance and it is attractively priced, yet there was an article in The Times a few weeks ago saying all these things and

saying that they had gone to buyers who had been buying Japanese equivalents and were they changing to Discovery. In many cases the answer was no because they had long-term satisfaction with the product. We have marketing men here, how do they get over this rather formidable obstacle?

(Mr Roberts) I do not know if there is a specific answer to the Discovery question but like anything else innovation applies to how you choose to view the marketplace and address segments or niches of it as much as what you think it is. Today it comes back to understanding who you want to do business with and how to add value to it. There is not a simple answer. Let me answer the question you raised which is precisely the same as Lord Butterworth's which is is it four wheel drive cars or a particular niche you are trying to answer.

17. I do not think you are answering the question.

(Mr Roberts) I do not think there is a simple answer. The question being asked of the readers of The Times may not have been the right question to ask about the Discovery.

18. If we move on to another product, the Rover 2000, that has had remarkable tributes paid to it and it has been elected car of the year. It has become a remarkable success story as a product from a major British company but when one looks at the last figures the share of that British company in its own home market is still going down. We get the right product as a result of complete organisation of the company, we have got a product at a competitive price yet it is still losing the market share, why is that?

(Mr Puttick) The short answer is I do not know really. Perhaps it could have something to do with the Rover policy of going for a profit rather than market share.

19. It is attractively priced.

(Mr Puttick) When people get into a rut of confidence in Japanese cars it is difficult to move them, you get a sort of inertia.

20. I was struck by your introductory remarks and the running theme all the time was British industry has really got a long way to go, there are a few exceptions but it is going to be a tremendous uphill struggle to do it. To a certain extent do we make this come true by all the time emphasising areas where we are behind?

(Mr Puttick) Yes, I think we do. I think we are all self-destructive, perhaps. In this room this afternoon we are looking for causes and problems. You can find some very good examples, the problem is very good examples are small in number unless we extend it to a macro thing. British Steel has been quoted as having done very well, and it has, but it has shrunk



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[Continued

[Lord Kearton *Contd*]

itself to a size where it cannot provide all the steel to the British industry so we are back to seeking imports again. We do not have the total resources to make it fly. We have a series of small islands of successful companies and to actually reverse the thing and get a growth of real continents of success we have to talk about the fundamental issues which Lord Vinson raised just now. I would like to come back on this fund manager thing. I had an interesting discussion with Jaguar last week and Mike Beasley who is Deputy Managing Director of Jaguar said they briefed the fund managers to go for the long-term and this was not for the greater interests of British industry, this was for the selfish interests of the Jaguar pension fund, and the Jaguar Pension Fund performed better going for a long-term view. I think it would be very interesting—it is something we have not done yet—to study whether this short-term running after a short-term gain and the share churn effect is even in the interests of the pension funds.

*Lord Gregson*

21. The DTI have produced a report stating if you put all the pension funds on the FTSE 100 and you sacked all the pension fund managers they would perform better.

(*Mr Puttick*) I believe they undermine the short-term interest.

*Lord Taylor of Gryfe*

22. The argument in favour of the hostile takeover which is somewhat related to the short-termism you were referring to is that the attraction of a takeover has in a number of cases improved the performance of the companies concerned. It is one of the factors that shakes up board rooms to be more effective, to produce better, to make greater profits and so on. You have said, in fact, looking at Germany the question of the hostile takeover does not arise but that is because of the shareholding structure, not because they take the view long-term. It is because of the structure of the boardroom and the involvement of their banks as distinct from ours and the external market situation here, the production of some companies, as in the case of the Swiss companies, for example, and the different types of shareholdings, different types of shares, non-voting and voting and so on. What is it then if they do not have the pressure behind them, the danger of an hostile takeover arising from non-performance, or poor performance, what is it that makes Germany a better performer than we are? In some cases I regard an hostile takeover as a factor in improving performance.

(*Mr Puttick*) I believe the basic strength is the fact that they have the freedom, or they have the option, or the interest to take the long-term view that it needs to really create a successful manufacturing business involving a long-ish term view. Product development in most cases takes a fair while, investment in new plant and equipment takes a fair

while, time in which profits will plateau or decline. Their owners there are more involved in the management of the business and more prepared to take what appears to be a risk which enables them to build for a long-term future. I would think there are probably lots of features but that, I would judge, is the strength. It is interesting that a nasty fright is not a bad way of getting a company to perform. To put, perhaps, one more axe on the table we have a concept called Breakout which is saying that a company can improve not by a few per cent per annum but if they have the drive and initiative they can improve their business dramatically by taking real leaps into the future. Land Rover had the ability to get a new product into the market in 27 months, that is an example. Hewlett Packard set a target to halve the time from product concept to that product breaking even on the marketplace. That change in the performance of the company is really radical, it is not just going in and turning up the better button, it is the whole structure and culture of the company that has changed.

*Lord Kearton*

23. That started at the top, obviously.

(*Mr Puttick*) Driven at the top.

(*Mr Roberts*) Man with a vision.

(*Mr Puttick*) Man with a vision, yes. We can look at British companies which today are successful and look back and see they had a nasty shock. Their patent protection vanished; they nearly went broke; they had a management buy-out or takeover that spurred them into action, perhaps it gave them a degree of protection for a spell. The Germans are not open to that or even protected from it but I think their way of doing it has been that they have had the ownership situation and the protection of the culture probably and maybe the technology drive from the top.

24. One of these committees looked into the Japanese last year in some depth both what we are doing in this country and over there. One of the things which came out clearly was the commitment of the people at the top of the Japanese companies to the product. Although you had all the supporting mechanisms at the end of the day it was not the accountants who were in trouble, it was not the lawyers who were in trouble, it was the product, the marketing and sales people and so forth.

(*Mr Puttick*) That is right.

25. Do you find in your investigations in Britain that particular identification with the product is common in companies?

(*Mr Puttick*) Sadly no.

(*Dr Ridler*) Could I follow on with another example? We have laboured the Land Rover one.



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[Continued

*Chairman*

26. We have slung a lot of remarks at you and you have not had the chance to respond. Would you like to collect those remarks together and respond now?

(*Dr Ridler*) There is another example which I would like to mention briefly which partly answers some of the points Lord Kearton was making and that is the example of Keeler Optical which is a company that, together with PA, won the Queen's Award last year for the development of the Pulsair Tonometer. That is a good example of a small company spurred into activity by something unfortunate: a piece of legislation which came into existence. It was a development, an innovation, which was led and stimulated from the top of the organisation. Keeler had the bulk of their business in high street opticians and with the deregulation of opticians they felt slightly vulnerable. They were already into manufacturing, mostly optically related equipment. They saw, with the deregulation, the need to do something dramatic. Richard Keeler, the Chairman, grasped that problem, that "insurmountable opportunity" and turned it into a surmountable opportunity. Working together we developed a device for testing for glaucoma. It has stormed the market. It is not new technology but it is innovative in the way it assembles technology. It has been enormously successful for Keeler Optical. It has generated, I believe, business in 70 countries, quite amazingly, and orders for what is a small company are of the order of 8 or 9 million pounds as of several months ago. That was stimulated by a nasty thing like: "Our turnover is going to drop dramatically because ...." but was championed by the man at the top and has turned into a very successful development.

*Lord Taylor of Gryfe*

27. Was that particular case researched in-house or was it farmed out to some medical schools? It seems remarkable a retailer of spectacles could have the resources to do this in-house research when the medical schools are probably better equipped.

(*Dr Ridler*) The development work was done within my own division of PA. The medical element associated with clinical testing was undertaken by Addenbrooke's Hospital in Cambridge but it was primarily the clinical testing aspects rather than the medical research. The technique is not unknown but the use in a small inexpensive portable de-skilled device which can be used by a paramedic rather than a skilled medical person, that was the vision of Richard Keeler and the implementation of PA.

*Chairman*

28. Are you able to say anything about the attitude of British companies to where the technology comes from, whether it is in-house or whether it is British or from overseas or wherever? Do some companies try to develop their own

technology, feel they are obliged to or at any rate be British about it or do they grab the technology from wherever they find it, including overseas and pay for it? What leads to the greatest success? Is it possible to give any recipes at all?

(*Dr Ridler*) It is a multi-part question which I guess will get a multi-part answer. I think the termism—short, medium and long—comes into this question as well as into many others. I think one area where I believe Government can help is actually in the longer term. One of the worries I have, and this is one of the axes I grind—one of my hobby horses—is Government can and does appear to be thrusting those institutions and organisations I believe should be generating seed corn for the future very much towards the short term, making universities commercial and operating on short time scales, making research establishments more commercial. I am not saying they should not be more commercial but we must not forget the seed corn. If you forget the seed corn, the blue sky research ideas, then in twenty or thirty years time we will discover it is too late. We do not know it for certain now. I believe we need to generate that technology and exploit it as it comes around. The first part of your question escapes me?

*Lord Vinson*

29. At the end of the day when we have done our talking we shall boil down to try to suggest things: what industry should try and do and what Government should do to remove obstacles that are preventing innovation from flowing in this country. Leaving aside the enormous question of the cultural gap, reflection of 100 years of education not necessarily pointing the right way and also not going into the debate of whether there should be positive innovation from Government but letting companies use their own resources, the level of tax on companies in this country is much higher and our depreciation levels are quite inadequate even to replace plant at an up-to-date replacement value. We are amortizing at half the rate of depreciation. British companies are declaring profits at half the level because they are not amortizing quickly enough. It seems to me we want to re-jig the amount of money we take from them and leave in the good hands of those that want to use it for good money, their own money and their own good reasons and let them get on with it. This is the whole point of having massive centres of initiative. Have you any thoughts, taking your point on innovation and the question of tax changes, on the view to enable companies to write off at a faster level? They are paid on know-how, they can amortize research now, which they do while they can. What can we do in terms of the taxation resources or the resources companies already have to let them keep more of it for the benign purposes of developing further innovative ideas?

(*Mr Puttick*) I do not think any of the three of us would claim to be experts in the field of taxation. I



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[Continued

[Lord Vinson Contd]

chaired a dinner last week on this very topic of the impact of corporation tax on investment and we had five or six, including Sir Ronny Halstead of British Steel and Cable and Wireless, British Aerospace—quite major companies—and we were looking at this. The facts were at the moment, apart from having a neutral taxation system we have a taxation system which does tend to obstruct or provide obstacles to investment whereas early in the 1980s we did not. There was quite a nice window of time in 1984 when it was worth investing during the change period. What I think the finding was generally at that meeting was the majority of chief executives did not really understand that and, secondly, that they did not feel it was a particularly major factor, they did not feel it was one of the major levers. Of course they would like to reduce Corporation Tax and have the full allowances but the view was that the manufacturing executives who were keen on investment would invest anyway, they would not be significantly obstructed by the tax system. It does not mean it could not be changed and improved a bit but it was not felt to be one of the major factors in their investment decision-making.

*Lord Taylor of Gryfe*

30. Did you do a paper with these conclusions?

(*Mr Puttick*) No, those were the conclusions that came out of the discussions around the dinner table. We had a stenographer there and we would be very happy to give you a copy of the transcript.

*Lord Gregson*

31. You talked in effect about the importance of blue sky but the Japanese did very well for 30 years without doing any blue sky. I know now that certain people in Japan are making noises about the necessity to do fundamental research and so forth but it is not really an idea which the Japanese are adopting with any enthusiasm. If you visit a Japanese university you cannot find the research department.

(*Dr Ridler*) In relation to the first part of the question which was related to where does technology come from, where do people access it and do they expect it to grow inhouse, our view would be it would be foolhardy to attempt to have all the potentially required technology inhouse and that is where a company, such as ourselves, sets themselves up and has a fairly nice business. To come to your specific question it is really the point of where the ideas and concepts come from and can you access them without needing to spend additional money. The Japanese have very conveniently and easily accessed their blue sky ideas or concepts in the West, in the UK, however I think if you look at things like biotechnology related patents the Japanese have many more than most other countries and they may be at a stage where they have more than all the other countries put together.

*Chairman*

32. Are British companies not only willing but active in seeking out technology no matter where it comes from to help them with their innovation?

(*Dr Ridler*) That is a different question and the answer is no to a large extent.

(*Mr Roberts*) This comes back to your earlier question about examples of successful appliers of technology. Certainly we have assisted a successful innovation and application of technology with our establishment businesses, ICI, BP, Glaxo, Beecham, probably Pilkington. I find it easier to associate the technological areas with the technical business process rather than the process-ee, chemical-ee and electrical-ee. If there was one Rolls Royce would be the best example because it is a world beating product and keeps adding to its performance. I am more nervous about saying British Aerospace, GEC and Hawker Siddeley than companies that are more process oriented in their business. The characteristic of those businesses is they are here to stay businesses, the characteristic is they are about long-term to improve their business which we all associate with significant spend on R&D. The spend very much occurs on the portfolio of the business so they can each take their turn in that spend. It is about the businesses we know do recruit and retain the skilled people, they are not a conglomerate, they are not the ones where nobody knows how the corporate value gets added to the business and, frankly, there are probably not enough of them. There are just as many very large corporate entities that are conglomerates and not much else, they are not really true developers of technology in this country. Those will be my examples of businesses that provide innovation.

*Lord Gregson*

33. I want to follow up a point that has just been made. You said the process industries are a better illustration for that point. I chaired the chemical industry Neddy for four years and the thing that worried us a great deal all that time, and it is still going on, was the chemical industry has a positive balance of payments but it is reducing all the time and the cross-over point has about two years to go, then we go into a negative balance. We are not successful on a worldwide scale. Three of the companies you mentioned are pharmaceuticals, do you not realise who pays for the R&D that goes into pharmaceuticals? They agree it with the health industry. They are not good examples of market forces or anything else.

(*Mr Roberts*) That is because there are not enough good examples to pick on in the UK. I personally think ICI is an excellent example.

34. It does not perform very well.

(*Mr Roberts*) Since it had this trauma of that one-quarter loss.



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[Continued

[Lord Gregson Contd]

35. It is not performing very well in world term comparisons?

(*Mr Roberts*) Is that by short-termism measures or long-term success measures?

Lord Gregson] They are pharmaceuticals getting massive payments from the health service to support their R&D. They sit down and work it out and agree it with them.

*Lord Taylor of Gryfe*

36. I am building on all you have said, the specific examples of the companies and so on. I look at this question of external technology and John Brown Engineering made engines for the great ships, the Cunard liners and so on, but at the end of the war the market no longer existed. If they had tried to develop their own technology in producing a new product they would probably be out of business by this time because they would have spent a lot of money on research. They made arrangements with GEC, General Electric, for things and imported their technology and John Brown is one of the great successes of engineering at the moment. It has something like a 92% export market selling turbines and boilers all over the world substantially based on the technology that they import. (a) it was a quick way to convert the company and (b) it did not inhibit them in any way, and (c) it was probably a good deal cheaper including the 5% paid for licences than developing their own R&D. In terms of British engineering success it is a success story based on imported technology.

(*Mr Puttick*) If I can respond to that very much in terms of the report we did for the DTI, "Manufacturing into the late 1990s". What the DTI expected was for us to describe in some detail the sort of manufacturing and product technologies that would be applied but in my view the biggest finding that came out of that was the critical role of the chief executives which is very much in connection with what Lord Taylor just said, forming alliances and relationships in this whole complicated structure of companies. We have been tending to wear our UK hats today but very few companies operate totally in the UK, we cannot just keep the UK Inc. flag. Our finding was, in a slightly flip phrase, that to be big is not necessarily beautiful, small is not beautiful, but to be well connected is beautiful. The things GEC have been doing to form alliances on an R&D level, a technology level, is a very exciting way to go. I would say their example is an example to other companies but the key is although I do not know the company that well I am sure it brought something into the relationship itself. It is not for a shell company that has nothing, to come and acquire something, perhaps the something it had was a lot of cash but in most successful alliances all parties bring something to the alliance. They might be good at manufacturing, distribution network or they might have a super product. In our jargon the key is to identify the critical competence, if you have

something which is critical it may be the heart of a good business. All companies have to recognise what is their thing, what they should do.

*Lord Gregson*

37. There are dangers, John Brown nearly went bankrupt because their licensee received an instruction from the American Government not to seek a contract to transfer technology to Russia. They had just received a big contract from the Russians. There are grave dangers in this connective business.

(*Mr Puttick*) Is that not a good point for boardroom roles and attitudes: the skill to do that right and perhaps the readiness to take that risk. I wonder how many boardrooms even have the attitude to do it. It is more typical to say: it is ours, we will only do our thing. We will not deal with a competitor, we will not set up a pre-R&D relationship with the competitors, the sort of thing Rolls Royce and GEC are doing. That is a boardroom which is pretty rare, I guess.

*Lord Vinson*

38. Boardroom attitudes come round full circuit if you do not mind getting round to the short termism. The development of competition policy seems to me to be very difficult to get right because the dozy sheep need wolves, you do not want too many wolves and you do not want them to get too dozy, you want to leave them alone and let them breed. I know this is a generalisation I am making but speaking generally would you say our competition policy as we have it in this country at the moment is generally helpful to the development of innovation or should we make it harder in terms of the takeover bid?

(*Mr Roberts*) Does your competition policy comment include level playing fields and the like?

39. We have erected structures of competition and financial policy and this Committee will have to come up with some solutions for the removal of obstacles that are manmade, some of the culture changes are going to be more long haul. In exploring that, on this question of boardroom attitudes, what, if any, thoughts have you on changes to competition policy, level playing fields and the like that you think might make a more benign situation in terms of the development of long term innovation?

(*Mr Roberts*) It is true to say we all passionately believe in the fact you do not get anywhere unless you set out to get there and make some statement to get there. Comments about the level playing field are just like saying: "Our policy is like a piece of cork floating on the sea and we will see what happens." All our advice to our clients is about understanding precisely where you are, trying to get it and how to get there, not arriving there by accident. The view we have is there needs to be some sort of top level glue that binds more of us together so the guy in the City



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[Continued

[Lord Vinson Contd]

making an investment decision is not following a different set of rules which is quite different from the guys working to analyse the long term rules of investment in the business. Those are back to infrastructure things, about getting some greater harmony between the industry, between the City, between unions and in education. That is bound together by something about the UK wants to achieve X. We do not really have that statement nowadays. Having said that, we find it very difficult to crystallise what is the best way of putting that package together. It is not what we have currently.

Chairman

40. We have given you and your colleagues quite a battering. I think perhaps there are just one or two questions from the list we sent you originally which we have not touched on. Perhaps you might like to give brief answers on them. One is the influence of European Community policies. Do British firms on the whole go out to seek opportunities from the Community and if so do they benefit from them? I am still talking about innovation of course.

(Mr Roberts) I happen to be aware of examples, Chairman, of European firms seeking out opportunities in the UK rather than the reverse and UK infrastructure benefitting from it, not so much in reverse.

41. UK benefitting from it?

(Mr Roberts) Acquisition of established UK companies by major German businesses which have gone from a defensive strategy to a long term growth with significant investment strategy and a change in the basic boardroom strategy, for example.

Lord Taylor of Gryfe

42. Japanese companies?

(Mr Roberts) It is back to my point about long termism. I am not sure whether the Japanese are long term. There are only about 25,000 people employed by the Japanese in the UK, half a million goes to American businesses. I would observe they seem to be quite good at managing our people and getting money out of our Government. I think it goes back further: if you have a long term infrastructure it breeds a management that thinks in that way but it is not just about "We must be long term", it is part and parcel of the process of management.

Lord Vinson

43. How would you achieve that? Have you any ideas on it?

(Mr Roberts) It just links in with you have not got to be looking over your shoulder at profits every five minutes and worrying about takeovers.

Lord Gregson

44. That is cloud cuckoo land, you have to look over your shoulder.

(Mr Roberts) I do not believe Siemens --

45. They do not have shareholders.

(Mr Roberts) They are a very worthy business because they have been very successful.

46. The shareholders sit on the board. They sit round the table like this.

(Mr Roberts) Yes.

47. They say: "Get on with it boys."

(Mr Roberts) Even if there are more shareholders, they are down to a more limited number of voting shareholders.

48. You get advice and help from the shareholders in Germany. You do not get shot at from the City. You cannot ignore your shareholders in this country, you cannot do it.

(Mr Puttick) That is one of the fundamental problems, you can be protected from them. In the sense you are a company within a large group effectively your shareholder is your group chief executive.

49. That is saying you have one shareholder.

(Mr Puttick) That is right. How we can get market forces to work on the City and the thirty trust managers and so on in a way which is in harmony with market forces working in the manufacturing industry, I do not know how to do it. In response to your question, Lord Vinson, yes I think in fact the competition policy is making life too difficult but I am awfully loath to say somehow provide protectionism because sadly people are human and they will make profit and spend it on themselves.

Lord Vinson

50. It is a question of where the parameters are? We have goal posts, do we need to move them slightly?

(Mr Puttick) I personally believe we do.

Lord Gregson

51. We have now got a running negative balance of about £18 billion per annum on manufacturing industry and it has not improved if you look at the first two months of this year. Is it possible that inward investment is the best way and probably the only way we can import long termism? Can I explain that inward investment we are getting from the Japanese and the Germans -- Bosch have invested a lot of money, they are investing their long termism.



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[Continued

[Lord Gregson Contd]

*(Mr Puttick)* Yes?

52. Is there any way we can deal with this £18 billion negative balance by importing long termism from overseas for inward investment? Is that the only answer we have got?

*(Mr Puttick)* I would hope not.

53. Look at it realistically: is it the only answer

we have got? Cut out the hope, that is for the birds.

*(Mr Puttick)* It is the only answer for the next five to ten years, it will buy us time. In that time we can learn from their culture or use it to change our culture in the next five to ten years. It is the only thing we have got to change the balance of payments, to retrieve that suitable realism, yes.

Chairman] May I thank you and your colleagues for coming along this afternoon.







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TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 14 March 1990

**CONFEDERATION OF BRITISH INDUSTRY**

*Dr Joe Tidd, Dr Brian Richards and Dr David Giachardi*

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WEDNESDAY 14 MARCH 1990

Present:

Caldecote, V (Chairman)

Chapple, L	Taylor of Blackburn, L
Chorley, L	Taylor of Gryfe, L
Gregson, L	Whaddon, L
Kearton, L	

#### Memorandum by the Confederation of British Industry

The CBI recognises that innovation is crucial to the future of manufacturing industry in the UK, and investment in innovation is a major theme of the CBI Jubilee Programme.

In September 1989 the CBI launched its first annual Innovation Trends Survey. This attracted a response from 239 companies, and we plan to publish the full results shortly, including a breakdown by size of company, sector, and region. This should provide valuable data relevant to the enquiry, and will be sent to the Sub-Committee upon publication. In the meantime we offer the following response to the questions raised in your letter of 31 January 1990, based largely on the preliminary findings of this survey:

1. People and organisation are crucial aspects of innovation, but are often overlooked as capital investments are more easily measured. Numerous case studies indicate that innovative companies typically have efficient lines of communication between research, design, production, marketing, and sales functions, and devote a great deal of attention to training and staff development. The NEDC will shortly publish an 'Innovation Tool-Kit' which aims to allow small firms to assess and improve the management of innovation, and the CBI supports these goals.

The results of the CBI survey are encouraging. The balance of companies believe that organisational constraints are becoming less important: 19 per cent think that the relationship between different functions within their company is improving; 13 per cent believe that organisational problems are increasing. Company commitment to innovation was reported to be improving by 21 per cent of respondents, and decreasing by 11 per cent; 56 per cent of companies plan to increase expenditure on training over the next twelve months.

2. Historically, the 'not invented here' syndrome has been a major problem in the UK. Recent OECD statistics for the technological balance of payments—money paid or received for the use of patents, licences, trademarks, designs, inventions, technical services, etc.—show that the UK and US are the only two countries having a positive balance; contrast this with the balance of trade situation. This is normally interpreted as meaning companies in the UK are good at R & D and generating ideas, but poor at translating these into new products and processes. However, the reason for the surplus is the relatively low level of payments to other countries, rather than a high level of receipts. In short, companies in the UK are still failing to exploit technology from overseas.

The CBI survey indicates some improvement over the next twelve months: 15 per cent of companies expect to increase expenditure on the licensing of others inventions; 44 per cent plan to increase expenditure on joint ventures or collaboration with overseas companies.

3. Anecdotal evidence suggests that UK companies pay greater attention to product innovation than to process innovation. In contrast Japanese manufacturers have traditionally excelled at production engineering, but have only recently focused on product development. Clearly the relative importance of these two forms of innovation changes over the life cycle of a product or industry: initially product development is most significant, but later production engineering becomes more important. Current international 'best-practice' indicates 'simultaneous engineering' of product and process is becoming necessary in many sectors as development times increase and product life cycles become shorter.

The CBI survey confirms a bias in the UK towards product innovation: 52 per cent of companies plan to increase expenditure on product R & D, but only 41 per cent on process R & D. In most cases product innovation is aimed at improving existing products (71 per cent), rather than creating new products based on new technology (55 per cent); quality improvement (79 per cent) and cost reduction (71 per cent) are the main reasons for process innovation.

4. The CBI survey suggests that Government support for innovation has become less effective. Twice as many companies (16 per cent) believe that current Government grants and tax concessions for innovation have reduced rather than increased incentives to innovate; this view was particularly strong among smaller companies.

More specifically, the CBI has recently completed a review of DTI support for technology, in particular the Research and Technology Initiative. The official report will be published shortly, and will recommend, *inter alia*, more support for technology transfer by means of technology consultancy for small firms and greater resources for regional technology centres.



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5. The City is often accused of 'short-termism', and we understand that the Innovation Advisory Board of the DTI will soon report on this question in relation to investment in innovation in the UK. In 1987 the CBI City-Industry Task Force found that the availability of finance was a less significant constraint on long-term investment than the cost of capital and lack of confidence in future market prospects. The CBI plans to examine the relationship between investment in innovation and capital markets in greater detail.

The survey indicates that the main constraints on innovation are thought to be new standards and regulations (28 per cent), uncertainty of demand (26 per cent), and insufficient internal finance (24 per cent); availability of external finance is reported to be an increasing problem by only 10 per cent of companies, and 7 per cent believe that the situation is improving. However, this survey was conducted in September 1989, before the most recent rises in interest rates. This has had two effects on investment intentions: firstly, it has made it more difficult to justify investment in innovation, as other forms of investment offer higher returns in the short term; secondly, it has depressed demand and thus undermined business confidence.

Since October 1989 the CBI Quarterly Industrial Trends Survey has also included a question on investment in innovation. In October 43 per cent of companies planned to increase spending on innovation, and 10 per cent to spend less; in January 1990 the figures were 34 per cent and 16 per cent respectively. The main reasons given for this deterioration were inadequate return on investment (49 per cent), uncertainty of demand (44 per cent), and cost of finance (20 per cent); only 1 per cent claimed inability to raise external finance was limiting investment.

6. The effect of different national legislative and regulatory frameworks on innovation is difficult to assess as so many other factors are involved. For tax purposes 100 per cent deductions for capital expenditure on 'any activities in the fields of natural or applied science for the extension of knowledge' are currently allowable in the UK. Clearly this is a much broader definition than that of the OECD/Frascati and SSAP 13 (revised), and the established scope of the statutory definition has been commendably wide.

However, existing tax regulations are restrictive in that if research relates to a prospective trade, rather than an existing trade, the expenditure is not allowed until that trade begins; the relief would be more effective if it could be set against the profits of an existing trade. In addition, the tax authorities have recently been adopting a narrow interpretation of the statutory definition, and the resultant loss of 100 per cent relief may add to the pressure of high interest rates to reduce capital investment. Revenue expenditure on research has hitherto qualified for immediate tax relief and members are opposed to the current suggestion of the tax authorities that it should be deferred to match future income.

We note that more generous tax concessions for investment in R&D are available in several other countries, but the impact is unclear; the US experience suggests this results in no net increase in investment. In any case multinational companies must have sufficient UK income to absorb any tax relief, and therefore the location of production facilities is equally important (see 10 below). However, the Government must regularly review its policy in this respect and be prepared to revise it should international comparisons show that business in the UK is seriously disadvantaged.

7. The CBI survey suggests that the prospects for technology transfer between HEIs and industry is improving, but that relatively little use is made of the services of public laboratories. A third of companies expect to increase expenditure on work with academia, but only 7 per cent with government research institutes; 45 per cent reported that they have no involvement with government research organisations.

8. As noted earlier, our survey revealed that 44 per cent plan to increase expenditure on joint ventures or collaboration with overseas companies, but only 27 per cent with other UK companies. The CBI strongly supports the Commission proposals for the new Framework Programme (1990-1994), and members believe that the original budget requested is the minimum necessary to support a critical mass of Community research. The CBI believes that such funding should not be biased toward either 'basic' or 'near-market' research, but should instead reflect the needs of world markets and maturity of the relevant science and technology. Members agree that the Commission should continue to emphasise programmes that strengthen the economic and social cohesion of the EC through international collaboration.

However, members feel that the current win-bid rate of project proposals to the EC is too low, and could be improved by earlier notification, and greater transparency and industry involvement during the definition of programmes. Existing procedures discourage the participation of SMEs, and result in wasteful multiple bidding by large companies.

9. Our survey indicates that increasing customer expectations and requirements are a major incentive to invest in innovation; 68 per cent of companies believed this to be the case. In particular, suppliers of intermediate products such as electronic and automotive components are being forced by customers to be more innovative. A growing number of companies are demanding higher quality components from suppliers, and sub-assemblies rather than components.

A recent example illustrates this trend. A Japanese electronics manufacturer in the UK invited a quote from an existing supplier for a new component, but rejected the quotation on the grounds it was too low. The Japanese company had detailed knowledge of its suppliers costs and believed that the margin allowed was simply too small to support continuous development of the new component; a higher price was finally agreed. Clearly this type of arrangement is only practical when long-term relationships exist between customers and suppliers.

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10. Many factors influence the location of innovative activities, including many of those outlined above. In certain cases, such as biotechnology, legislative and regulatory issues are becoming increasingly important. Recent experience in the FRG and Denmark confirms that companies are prepared to relocate R&D facilities when faced with severe legislation. Taxation can also influence the location of R&D facilities: it has been suggested that some multinationals have located research in countries where they have adequate income to absorb all their tax relief. Thus the location of production facilities must be taken into account.

Many foreign multinational companies continue to establish R&D centres in the UK, and this may be due to the proximity of their European production facilities, and the relatively low cost of highly skilled scientific and technical staff in this country. Most recently, Japanese companies have begun to add R&D facilities to their existing manufacturing base in the UK, following the long-established trend of American and European multinationals.

11. We regret that we have not had the opportunity to consult our members regarding the ACOST report *Defence R&D: A National Resource*. However, we note from our previous submission concerning R&D definitions that much of the work funded by the MoD is product development rather than R&D as defined by OECD/Frascati. This suggests that the potential for spin-off from such work to the civil sector may be limited.

We hope that these comments are useful.

Dr. Joe Tidd,  
Technology Group  
2 March 1990



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[Continued

## Examination of Witnesses

DR JOE TIDD, Technology Group, CBI; DR BRIAN RICHARDS, British Biotechnology Ltd., and DR DAVID GIACHARDI, Courtaulds plc, Confederation of British Industry, called in and examined.

*Chairman*

54. Good afternoon, gentlemen. We are very grateful to you for coming along and helping us. I understand, Dr Tidd, that you are leading the delegation. Would you like briefly to introduce your two colleagues and tell us who you are.

(*Dr Tidd*) I am the only member of the CBI policy staff here. I am responsible for industrial innovation in the CBI, amongst many other things. Dr Richards is a member of our Research and Manufacturing Committee at CBI. He is Chairman of British Biotechnology and therefore represents a small company in the UK. He is also Chairman of the CBI Biotechnology Working Party. Dr Giachardi is also a member of our Research and Manufacturing Committee. He is representative of a large company, Courtaulds plc, where he is Research Director and also Chairman of the CBI working party to examine the DTI support for industry.

55. Thank you very much. We are all agreed that it is extremely important to increase the overall output of manufacturing industry, for obvious reasons, to meet the demands of the export and home markets. We believe that a greater investment of resources in innovation is a very important contribution to achieving that objective. Our task is to try to determine what are the constraints to greater expenditure on investment in innovation, and to seek ways of removing those constraints on the one hand and encouraging greater investment in innovation on the other. Before we ask you to make any further introductory statement you would like, may I thank you for the memorandum you have sent us and may I try to clear up a point which has concerned me and, I guess, one or two other members of the Committee. This relates to your last paragraph, paragraph 11. You seem to be implying that R & D is something different from product development, and that the Frascati definition is in some way relevant to that. As I understand the Frascati definition—and I have an extract from it here—product development is defined as “systematic work that is directed to produce new materials, products or devices or to improve those already produced”. That is surely the “D” of “R & D” which is research and development. Is that the clear understanding of all of you?

(*Dr Tidd*) I would accept that. I think the problem is that OECD examined the whole problem of R & D and international standards. You have to have some definition to collect data clearly and to analyse things clearly. There is a danger of examining definitions too finely, and we may get distracted from the whole point of product development. The OECD Frascati definition of development generally stops with prototype development, and we all agree that development beyond that stage is equally important, particularly

in the UK case. So we would like to go beyond the OECD Frascati definition of R & D and look at the whole innovation process.

56. I think we regard prototype development as being until the product is ready for manufacture and sale in the markets?

(*Dr Tidd*) Yes.

Chairman] Innovation is the use and is part of the innovative process. I think we understand each other.

Lord Gregson] My Lord Chairman, it does cut you off from many of the statistics.

*Chairman*

57. Exactly. That is the problem, I appreciate that, but there are different ways of using statistics, and R & D is used in a loose and rather different way, but I do not think we need to be confined by statistics, at least at the moment. Do you wish to add anything to your memorandum, before we start asking questions?

(*Dr Tidd*) There is nothing to add to the written submission. We would just like to explore it in more detail.

58. Then perhaps I could start off by asking you what do *you* think are the major constraints to manufacturing industry increasing its investment in innovation so as to increase its share of world trade and therefore its output?

(*Dr Tidd*) That is a very broad question. Clearly, from various CBI surveys, and in particular the recent CBI Innovation Trends Survey, two things come out as being *the* most important to British industry—or at least are perceived to be the most important constraints to innovation. The first is demand. Clearly things like interest rates affect demand and therefore affect business confidence. Business confidence is related to demand, so the first and perhaps most important constraint to investment in innovation is demand. The second and related issue is the cost of capital. I would distinguish between the cost and the availability. Our survey suggests that cost is the main problem in the UK, rather than the availability of capital: firstly the cost of capital reduces the incentive to invest in innovation; secondly, it is suppressing demand within the UK, and therefore it is affecting business confidence and thus investment in innovation. So the cost of capital is very important.

59. Let us concentrate on the first one for a moment. You say that there is an inadequate demand, and yet there is an excess of demand over supply of approximately £25 billion a year, so there cannot be an inadequate demand for the products of

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[Continued

[Chairman Contd]

manufacturing industry, otherwise the requirements of the home market and export market would be satisfied.

(Dr Tidd) That is at aggregate level, and that is the case, clearly. The problem is historical. The sectoral and industrial structure of the country historically has not been geared towards consumer products. One of the big problems in the UK is the deficit in consumer products rather than intermediate or capital goods, so clearly we have to disaggregate supply and demand when we make statements like "demand is a constraint". But throughout the sectors covered by the survey, which is broadly representative of UK industry, demand is perceived to be a constraint. I would accept that aggregate demand is much higher than supply, so that is not an ultimate constraint. In the short term, though, given the current industrial structure of the UK, it is a constraint.

Lord Gregson

60. You said that historically we have not been geared to consumer products, but that is only very recent history, is it not?

(Dr Tidd) Yes, but in the UK there has been a trend away from consumer products.

61. A very recent historical trend?

(Dr Tidd) Yes.

62. One has to remember that 20 or 30 years ago we were still selling more motorbikes than any other country in the world. That is recent history, surely?

(Dr Tidd) Yes.

Chairman

63. You say that it is in consumer products only, but that is not really accurate, is it? In telecommunication and sound recording equipment—though some of that includes consumer products—there is there a deficit of £1 billion; on electrical machinery, electrical parts and the like there is a deficit of over £1 billion. So it is not only consumer goods, is it?

(Dr Tidd) No, perhaps that was an over-simplistic generalisation. Essentially there is a mismatch, if you like, between supply and demand, such that in the sectors where UK companies are currently active and are strong, demand is insufficient. You could say that industrial structure is wrong, but given the current industrial structure, the short-term constraint is demand.

64. Does not it mean, then, that British industry is not sensitive to the market?

(Dr Tidd) It is, but market forces take time; industry must react to such changes in the long term.

65. So you say that nothing can be done?

(Dr Tidd) That is not the case, no, but I am saying that if we accept the current industrial structure, then the main constraint on innovation is the cost of capital and business confidence, which in turn is a result of suppressed demand, in those sectors where UK companies are active currently. But in the long term that may not be the case.

66. I do not think we accept anything. We want to make proposals for change. If the present industrial structure is wrong, we want to know how it is wrong. We would be grateful for your help in telling us how it is wrong and where we can make proposals for putting it right.

(Dr Tidd) It is impossible for any nation to be strong in all industrial sectors. As you appreciate, even Japan is very weak in aerospace, and in defence technology, but it is very strong in consumer durables. There are strengths and weaknesses in all economies. In Britain we are very strong in several sectors—chemicals, aerospace, defence.

67. We are not trying to knock British industry, we are trying to find out ways to make manufacturing industry better. Perhaps Germany is a better example where they have a substantial positive balance of payments.

(Dr Richards) I have followed this discussion so far with great interest. If I am allowed to make some comments on British industry in general, I think I would not agree that it is lack of demand—it may be the wrong kind of demand. The public now is clearly used to very high quality products which are tending to be supplied in the consumer area from countries abroad. Therefore, I think British industry needs to look at the way in which it carries out its research, its market research, and its product design and then follow that with efficient manufacturing capability. In other words, quality is at the very basis of everything that I think British industry needs to pay attention to.

68. Quality includes the —

(Dr Richards) Quality in the absolute sense—quality of concept, design and execution.

Lord Taylor of Gryfe

69. We are generalising far too much.

(Dr Richards) Of course we are.

70. I would be more interested in specific examples of specific companies as well as specific sectors. I would just like to ask, when you make these generalisations that we have not been adaptable, have not assessed the market properly and so on, on what basis you make this generalisation—on the basis of some broad statistical evidence or are you looking at companies?



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[Continued

[Lord Taylor of Gryfe Contd]

(*Dr Richards*) I am looking at consumer product areas. I accept what Dr Tidd says, that British industry is certainly not weak across the board—we should not be trying to convey that impression—but if you look at leisure consumer goods, even things like cameras, there is no question but that the British camera industry disappeared a very long time ago, and the business of taking photographs has been known to be a growth area in terms of the consumption of films and so on. So clearly it is an area in which we ought to have tried to make an effort. We are not “internationalised” enough. If you look at the Japanese camera industry, it gets its micro-processor control technology from Motorola in the United States. One of your Lordship’s questions is, are we able to in-license and out-license technology? I would suggest the British camera industry would have done well if it wished to survive actually to look at opportunities to in-license technology, in this case from the United States, before the Japanese were able to do it for them. If we take consumer goods like washing machines and all those things that go into the kitchen, there is no doubt that foreign suppliers are able to meet the demand and meet it with quality. I think there is still a possibility that British industry could revert to this—even the Russian military might is about to be turned over from tank factories to making washing machines (whether it will succeed is another matter)—and I believe it is possible for British industry to recover lost ground in the consumer product area.

Lord Chorley

71. Is that not just saying we are not very innovative?

(*Dr Richards*) Of course it is.

Lord Chorley] What is the reason?

Chairman

72. Lord Chorley is pointing out that the reason for the camera position is that we have not been sufficiently innovative because it has been clear to people for years there was a very good market for cameras which the Japanese have now snapped up. Lord Chorley’s question is, why have we missed that?

(*Dr Richards*) I am afraid it probably comes back to the long-established concern about the ability of people at the concept level, the design level—whether in science or engineering—in this country to match anything in the world, but where we have continually failed —

Lord Chorley

73. Was it “not-invented-here”?

(*Dr Richards*) No, I do not think that is the issue here. Where we have failed is in translating the

inventiveness of those people who are conceptualising and producing new and better ways of doing things into products of manufacturing industry.

Lord Gregson

74. Why?

(*Dr Richards*) I happen to be, as you probably know, at the sharp end of what you might call innovative operation. I believe that the only way you will be able to make that transition from good concept through to quality operation is to choose your people very carefully—and we do have a shortage of people, I think, in the scientific and technical areas. Everyone will give you reasons why that is the case. When you have your people you must organise them in a way that they understand will meet the objectives that they are being asked to work to, you must motivate them and you must ensure that you have very good communications at all levels. I do not think British industry, if you go into its day-to-day operations, necessarily does that very well.

75. That indicates to me patient money.

(*Dr Richards*) I have to agree with you.

76. Does patient money exist in the United Kingdom?

(*Dr Richards*) I believe it does. I think the cost of patient money is probably higher than the cost of non-patient money.

77. Could you talk to me privately outside and tell me where it is, as I am in need of some of it?

(*Dr Richards*) There is patient money available. It depends on how and where that money is coming from, how it is being invested. There are venture capital organisations in this country equal to anything in the world.

78. They want 40 percent as a return.

(*Dr Richards*) From my own experience they (investors) can be persuaded if the returns in the longer term are greater than in the short term. They are persuadable.

79. Are you not talking about the exception that proves the rule?

(*Dr Richards*) I hope I am not. Certainly I have fairly broad-based experience.

80. That is an indication that you are talking about the exception.

(*Dr Richards*) I do not believe so. I think if there were more exceptional —

81. Why has this all happened?

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[Continued

[Lord Gregson Contd]

(*Dr Richards*) We do not have enough people being motivated by their own capabilities. It is not just a case of not getting the capital. If you talk to people supplying that capital, they have no difficulty in finding suitable entrepreneurs in the United States and elsewhere. They have difficulty in finding entrepreneurs in this country.

Lord Taylor of Blackburn

82. I think the suggestion that was framed, my Lord Chairman, was that we were generalising. Each one of us can bring up cases of individual organisations that have been very successful. I was thinking, when you were instancing the Japanese camera industry, about the British security industry and its technology—one of the finest in the world.

(*Dr Richards*) Yes, I am sure you are right.

Lord Kearton

83. Dr Richards' recipe seemed to be just what the Japanese have been doing. In fact, we were doing an enquiry about Japan last year. The criteria laid down which the Japanese follow are rather interesting. In the consumer industry there has been a deficit lately in television sets. Now the Japanese have really taken over manufacturing television sets in this country and we have an export surplus. We all know we have a deficit on cars of about £7 billion per annum and, even on the authority of Mr Ridley and various other people, when all the Japanese companies get into full production we hope to reverse that and have a positive balance of payments on motor cars. Equally one of the things we looked at was the very old-established business of manufacturing tyres. Under British management, British ownership, the thing was losing money and it was rather desperate. The same companies, taken over by the Japanese, in three years are very productive with excellent labour relationships and establishing export markets.

Therefore, it would seem that in fact an awful lot of trouble comes down to management, would it not?

(*Dr Richards*) Absolutely. I think the criterion which I there exemplified—the people in the organisation—is absolutely essential at the managerial level. I am talking about the kind of high tech industry where you have highly qualified people throughout the organisation, and therefore the effectiveness of the management is all the more sensitive an issue, because people throughout the organisation can see its deficiencies, if there are any. So I believe you are right. I think the controlled experiment you referred to shows that if you take British working people and ask them to make television sets under current UK managerial capabilities, they may not do it anything like as well as when you bring in Japanese forms of management. I believe that there is a lot to be learned from the Japanese.

84. We looked at Nissan a while ago and found that the productivity was up to Japanese standards. We found that the number of Japanese working at Nissan, out of a total workforce of nearly 3,000, was half a dozen. That was equally the case with the tyre companies. When we looked at Toyota they were setting up a big engine plant. They are now talking about a third plant in this country. If you look at the first recruitments they are making for the management of production they are all British people. In other words, there is a very small handful of top Japanese managers. They are full of confidence. They say that you can take the ordinary run of British managers and the ordinary run of British workers and make a great success of it. What would your comment be on that?

(*Dr Richards*) That would seem to suggest that you are narrowing the area of responsibility really to the top management of any organisation. If the middle management are British and the top management are Japanese, and that is a successful formula, then it would suggest that it is our top management that is not doing the job as well as it should.

85. One or two of our questions are directed to this, and I would like to press you directly on the question of whether our failure to innovate is a top management failure more than anything else?

(*Dr Richards*) In our very high technology industries—and I believe we have a number of areas where we can define them as high technology—we still do not have very good technically qualified people necessarily at the policy-making level of management. If you compare us with the longstanding tradition of high technology industry in Europe, you will find that there are very many more technically qualified people on boards of companies which are clearly successful—for example, in the chemical industry and elsewhere they are polymath by definition but nevertheless they do understand technology.

Chairman

86. I would like to make the point that we are not only interested in high technology innovation, we are interested in innovation across the whole of the board from any level of technology.

(*Dr Richards*) Yes, I understand.

87. I think you are saying or implying, are you not, that we shall not make progress in any company unless the top management are determined to innovate, to train people and to do all the things that you said were necessary to innovate, including finding the money which can be found with determination?

(*Dr Richards*) Yes.

Chairman] Therefore we have to ask you what it is you think should be done to create greater



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[Continued]

[Chairman Contd]

incentives to managers to do the kind of thing that the Japanese top managers seem to do successfully? Have you any ideas that you could help us with on that?

*Lord Chapple*

88. Is it financial, or cultural, or what?

(*Dr Richards*) I believe that the motivation element has to be very strong not just for top management but for middle management and, if at all possible, as far down through the organisation as possible. In our company, for example, we set up as a matter of principle the need and the requirement to provide a stock option scheme which would be open to everyone, right through the whole organisation, even if they were non-technically qualified people. We will strive to maintain that. This, of course, is possible in a start-up situation, but it may not be quite so easy in existing organisations. So providing the motivation from the top to the bottom in an organisation is the kind of thing which one should attempt to achieve. What I find very difficult, apart from the criterion which I referred to a moment ago, is the understanding of the nature of the business in all its aspects, including the technical ones, as being at least available to the top management, by having appropriate managers at board level, whether they are non-executives or executives. I think you have to have discussions at board level which really do get to the important elements of whether the whole of that manufacturing operation is going to be successful. There has to be an understanding of the technical aspects.

*Lord Gregson*

89. You are suggesting that stock options are the ideal incentive?

(*Dr Richards*) It is one way.

90. Let me point out that it is illegal in Japan, because you cannot actually offer shares at less price than the market price. It is endemic in America, and they are in a worse mess than we are.

(*Dr Richards*) I take your point.

91. I do not see the connection between that type of incentive and any solution to our problem.

(*Dr Richards*) I hope I did not mislead you. It was not intentional. I merely gave the example in my own company of one of the ways of doing it. I have just come from a three-day off-site conference for our company's management. We have people who range in age from perhaps 30 up to about 40 (that is the overall range, because we are a relatively young company, though I am the exception obviously!). They have had a three-day total-immersion discussion about what they are doing at the moment and where they plan to go from here. We have just been summarising that discussion for some of our technically qualified non-executive directors, of

which the foremost one you will know is Sir Charles Rees, ex-ICI. The commitment—scientific, technical and commercial—which comes out of such a relatively short period of time, but totally separate from the day-to-day activity, really has to be seen to be believed, and it is very impressive. Many companies do this. I believe that all top management of all companies should do it in some way or another, and I believe that by concentrating on the very details, the nuts and bolts, of their operation in an isolated way rather than in the somewhat, shall we say, organised discussions which occur in board meetings, British industry would benefit considerably.

*Lord Chorley*

92. Are you saying that what you have just explained is rather novel in British industry?

(*Dr Richards*) It is far less common in British industry, in my view, than in Japanese industry and in American industry. I do not know much about European industry in that regard.

*Lord Kearton*

93. I wonder whether Dr Giachardi would like to comment on what has been said?

(*Dr Giachardi*) I would certainly underline some of the things which Dr Richards has been saying. I think that clearly you need high-level top management commitment to these things, and that it helps if those involved have a high level of scientific and technical training. If we are talking about technical innovation, my general observation would be that that is fairly low in most UK companies. One might ask the question as to why that is. I sense that one of the things which Dr Richards mentioned earlier was the inability of some companies to attract high-quality people. That is a problem which will get worse. That is nothing new. Indeed, I would be less than honest if I did not admit that I ended up with a high-quality technical qualification from one of the better English universities, and at that point I went into financial services, I went into management consulting. It was only ten years after that that I found myself back in a major UK company in a technical role which I think, in practice, I fulfil rather well because of that combination. However, that was a long time ago, and it was an early symptom of the drift that we all suffer from today. I am sure that if we could find a mechanism for attracting more people at *all* levels, particularly at senior levels, into manufacturing industry, we would improve things. If I may make one other comment—and I am conscious that you want not to generalise—it is a general comment that one of the problems which we suffer from is people's lack of confidence in the success of innovation when they are setting out on the process. We tend to focus on R, on research, but we all know that there is a sequence that goes from research to development to implementation. People talk about the cost implications that go from 1 to 10 to 100 and so on. However you choose to describe it,

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[Continued

[Lord Kearton *Contd*]

it is a very expensive process which requires patient money. In a sense, one of the problems which we suffer from is that the conceptual understanding of the innovation process, which would give people confidence in the path they were embarking on, is not there. It may not be possible at all, but it certainly is not there at the moment.

I use the words "conceptual understanding" loosely. With the conceptual understanding and frameworks which are built around the financial exercises which one can do on mergers and acquisitions, one can clearly do the sums on acquiring another company and changing it. There is a conceptual arithmetical framework: its equivalent does not exist in the understanding of the innovation process.

*Lord Whaddon*

94. Harking back to the example of the fine performance of British management and workers under the Japanese, is it not possible that this tiny handful of Japanese top management act as a channel for innovation which had already been done in Japan? Have we any example of innovation which has originated here under this system? Secondly, do we know of any differences which exist in Japan compared with the organisation here which would give rise to original development in Japan which they would then feed through here?

(*Dr Richards*) I think I may say we do not really know enough about how the Japanese manage their own industry, except with regard to their concentration on issues of quality. That is particularly noticeable, for example in consumer goods like motor cars and again camera equipment and other similar things. I believe, though I am afraid this is just hearsay, that in their manufacturing operations in this country they involve the workforce at all levels, but particularly in ensuring that they are not just conscious of the importance of the quality but they are really vigilant and operate quality circles, they motivate people actually to recognise that quality is at the very basis of the operation. So to take up your point as to whether they bring in the design and the concepts, they almost certainly bring in virtually every technical aspect but there is still some gap between having good design and very high quality and continuity of operational excellence, manufacturing excellence. So you have to maintain that. I believe they are just very good at maintaining it.

95. But then the very involvement of people is a factor which is pointed out in your point no. 1 here. That also has come from Japan. Why did we not originate it?

(*Dr Tidd*) I think we have to be careful once again. Innovation means many things to different people. I think we are discussing two distinct issues—one is product and one is process innovation, if you like. Again historically the Japanese, like the American multi-nationals before them, have located manufacturing facilities close to end user markets.

That is quite clear. They have been accused of having "screwdriver" plants in the electronics industry in the past, and more recently similar things have been said of the car industry. The Japanese have followed the example of the American automobile industry before the war. Development facilities are now slowly coming to the UK. For instance, recently Sharp announced an R & D centre in opto-electronics in the United Kingdom. So we see first the production facilities being transplanted, followed by the research and development facilities. So they cannot be considered in isolation. I think the suggestion was that we can learn a lot from the Japanese in terms of manufacturing efficiency, quality and productivity, and it is quite true that transplants in the United Kingdom and the United States are now matching Japanese plants which results in both quality and productivity. So there is no magic infrastructure in Japan which results in production efficiency. But when we look at the product development, I think it is as yet an unopened book—we have to wait and see what happens. Even in the United States where they have had several years experience of R & D transplants there is no clear-cut case of whether these are simply design studios or proper research and design facilities.

*Lord Gregson*

96. Obviously Sharp in the UK represent about 0.0001 percent of the R & D spending of Sharp. They can throw that away without thinking about it. I do not think it indicates a trend, do you?

(*Dr Tidd*) Not one transplant—I agree.

(*Dr Richards*) It is too early to say. I can give another example, if I may, which I think is a novel venture on the part of a Japanese company which may be followed by others. This is in the pharmaceutical industry in which Yamanuchi has now, I believe, publicly announced that it intends to set up a fundamental research laboratory in this country in Oxford and it will be staffing that laboratory with British scientists, and it is looking, shall we say, ten years down the road in terms of discovering new phenomena which will lead to new drugs. So that is a substantial plan. It may still only be 2 to 3 percent of their R & D bill but I suspect it will reward them by a disproportionate amount.

97. Having said that, does it not then depend when the intellectual property is developed and for what reason? Implanting almost a spy ring in Oxford to extract good ideas, then take them back to Japan and develop them there to produce for the world market is not my idea of technology transfer; is it yours?

(*Dr Richards*) I think you have put your finger on a very important point and, as one knows, in science and technology the protection of individual properties is by a patent system. The output from such a laboratory will undoubtedly be patented by



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that company and will be patented on a worldwide basis, but, of course, the accrued profits and royalties will all go back to Japan.

Lord Kearton

98. As an interesting case which is relevant to our recent discussion, could we take a product called carbon fibre which was introduced about 20 years ago and has been under simultaneous development for 20 years in this country, Japan and America? I am sure Dr Giachardi can bring us up to date on this.

(Dr Giachardi) It is a long and complex story, as I am sure you are aware. In the sense that carbon fibre was first developed, and history differs as to whether it was first invented at Farnborough or in Japan—but I prefer to vote for Farnborough—then licensed by the United Kingdom Government, amongst others, to Courtauld's and we spent, I suppose it is now, 20 to 25 years —

99. 1972.

(Dr Giachardi) — 20 years to the point where now we have a reasonably successful business in the United Kingdom and are also manufacturing on the West Coast of America. But it has taken 20 years to get there and that illustrates, I think, the timescale required for some of these major innovations. It also illustrates the pitfalls on the way, because those of us with long memories can cast our minds back to the problems with the RB211 and Rolls Royce and carbon fibre causing difficulties.

100. With respect, not the same carbon fibre.

(Dr Giachardi) I accept the point, but it gave the product a bad name. Now one has the growth of a major downstream industry from carbon fibre in the composite materials. Again to illustrate the point of the time these things take, what is now happening—I say now, it has been happening for ten years plus—is the development of the processing skills for these new materials we are talking about, the introduction of new materials. It is one thing to develop the material itself, but it is a much more complex problem to process it. The process now going on is the development of technical processes which allow the use of these new materials, very much repeating what happened in the early days of the development of thermoplastics. Somebody invented polyethylene, but someone else had to invent injection moulding and extrusion. With carbon fibre, and other composite materials, the whole processing of these has had to be developed over very long timescales. That, I think, is the essence of one of the problems the United Kingdom faces relative to Japan. We have touched on the issue of patient money. My sense is that the capital markets in some other countries operate in a way which allows patient money to operate for longer.

101. At the present time how is the market divided between Britain and America and Japan?

(Dr Giachardi) I think it is easier to describe it, if I may, between Europe, the United States and Japan. The bulk of it is in America at the moment with the aerospace industry, followed by the Far East with leisure goods, and then Europe following behind very much driven by the successes of the two customer industries, which are aerospace and leisure goods—tennis rackets, fishing rods and so on. That clearly may change if, as seems likely, the Japanese begin to develop their aerospace industry. One can see the beginnings of Boeing forming partnerships with Japanese companies which may change where it goes to.

Lord Chapple

102. With all due respect, we more or less know what is going on. What we are trying to get at is the reason *why* it is going on, and why are we not able to match it? So far all you have said is that the Japanese have found a way of financially motivating people. We know that too. But that has been an age-long argument—that if you provide financial incentives you can get almost anything done.

(Dr Richards) I hope we did not give that impression.

103. Remember, I posed the question to you was it financial or cultural? You only dealt with the issue of the stocks.

(Dr Richards) I apologise for that. What I think we have seen is that the Japanese managerial capability can work just as well in this country, with an almost totally British workforce, as it does in Japan, and maybe even better. I do not believe that Japanese industry motivates its people by payment. In fact, I really am pretty sure that they pay rather poorly. I do not know that they have very imaginative ways of stimulating their workforce to deliver—as they clearly do—except by good, strong, highly communicative management.

104. So there is a cultural issue here that we have not been able to fathom yet, do you think?

(Dr Richards) I think we have to accept that we have not got to the bottom of how the Japanese are so successful in our own country with our own people and with our own constraints.

105. Thinking aloud about this, if we could take the British workforce, the management as well as the blue-collar side of industry, and put the modern innovations on them 300 years ago, would we have had results similar to those the Japanese get?

(Dr Richards) I think that 300 years ago we were rapidly approaching a period when we *were* the most successful engineering manufacturing industry in the world.

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106. That answers the question, then, does it not?

(*Dr Richards*) Yes, it does. I believe it is still possible to do what is done there.

Lord Gregson] I would accept 200 years ago, but I would not accept 300 years ago.

*Chairman*

107. I think we have pursued that part of the subject enough. I think that so far you are saying that top management in a company and the determination to innovate is a very important factor?

(*Dr Richards*) I think that that summarises it.

*Lord Gregson*

108. Could we sum it up by saying failure in the boardroom?

(*Dr Richards*) Yes. I would go further and say that in our case we do not believe that in formal board meetings you can have an adequate discussion, so we alternate meetings of directors with formal board meetings. In meetings with directors there is a lot of fur flying, and we believe we get to the bottom of issues which are then dealt with in formal board meetings very much more successfully.

*Chairman*

109. Perhaps we could pass on to another question. You say in your memorandum that "companies in the UK are still failing to exploit technology from overseas". It seems to me that we have a difficult problem in many parts of industry—your camera example is a good one—where we are virtually out of an industry. If we go on like that we shall never get back to where we want to be. Therefore, we have to get back into some industries that we are now out of. Would you agree that one of the ways of doing that is to take technology from overseas, by licences or in some other way, and put value into that and use it as a springboard to get back into an industry?

(*Dr Richards*) I agree absolutely with that, and I believe that it is something which, from *my* perspective, British industry across the board does not do very well. But I would tell you that in the pharmaceutical industry, with which I am pretty familiar, cross-licensing deals are going on all the time and they are very invigorating.

110. But the pharmaceutical industry is one of the most successful industries as far as the export import balance is concerned.

(*Dr Richards*) You have made the point!

111. Putting on your CBI hats, because you are all chairmen of one of the committees, do you have any comments on this? What more could be done to help us get back into industries that we have lost?

(*Dr Giachardi*) If I may say so, I think this is an over-generalisation. I think that it varies from sector to sector. Dr Richards has talked about the pharmaceutical industry. I can see the packaging industry as well where there is a long history of cross-licensing. You need to think about the industry structure, where is the source of innovation, and the extent to which companies can internationalise (if that is the right word) products themselves, or whether they actually need to go and license people in local markets. At a general level you cannot answer the question; you need to go to the individual sectors.

112. The general point is that if we are going to get back into some of the industries we have lost, we have got to take advantage of the technological information that is not available in this country but is available overseas?

(*Dr Tidd*) Yes.

(*Dr Giachardi*) If what you are going to do is to license technology from another source, you then have to decide what it is that you bring to the party, what your own competitive advantage is; because it clearly is not in that case necessarily technology, you have to think what else it is you are going to do.

113. Perhaps it is a market.

(*Dr Giachardi*) Distribution, whatever.

*Lord Kearton*

114. I would like to ask Dr Giachardi, when you talk about what advantages you are going to bring to it, in your view, what advantages does Britain bring to these kinds of exchanges? What are our advantages that we can build on?

(*Dr Giachardi*) I was looking at it from the point of view of the individual company rather than from the country's point of view.

115. Take your own company, then.

(*Dr Giachardi*) I think the advantage our company brings is the ability to exploit a piece of technology more quickly and more cheaply than many other people, simply by a management style that has been built up, which is (to use a colloquialism) "fast on its feet". I think that is a skill which we have which is quite valuable. That is not the only way of doing it, but I think what one can do is take a piece of technology, put it through a distribution channel or some such, and, being fast on your feet, you can succeed. I do not think you should do so by not exploiting your own technology. They (the two processes) are complementary, not one replacing the other.



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*Lord Gregson*

116. Are you suggesting in your example that the packaging industry is a successful one as far as the UK is concerned? I may say, it is not my experience, actually.

(*Dr Giachardi*) On balance, I would suggest that, yes, although it has problems looming which it will have to deal with. I am particularly thinking about environmental issues. I sense there is quite a lot of thinking going on to be innovative about those issues.

117. Can I point out that the only real measure of success is the balance of payments. Certainly in the confectionery industry there is virtually no wrapping or packaging machinery now produced in the UK, it has all been imported from Switzerland.

(*Dr Giachardi*) But you are talking about the machine tool industry that supplies the packaging industry, and I am talking about the actual manufacture of packaging.

118. I am talking about the packaging materials.

(*Dr Giachardi*) Correct.

119. Can I clear up one point. You mentioned the pharmaceutical industry as being a successful one. Is it not apparent that in the ultimate account the R & D in the pharmaceutical industry is paid for by the taxpayer, because the industry sits down and agrees with the Department of Health what the drug costs shall be, taking into account R & D expenses?

(*Dr Richards*) I am sorry, I cannot agree that it is paid for by the British taxpayers, because —

120. Who else pays for it?

(*Dr Richards*) It is the revenues from products sold abroad which will contribute mainly to the income of the British pharmaceutical industry in exports.

121. It is roughly about 60:40 in favour of the National Health Service at the moment, right across the board, is it not?

(*Dr Richards*) You are actually quoting a figure to me that the export from the UK pharmaceutical industry is 60 as compared with 40 inside —

122. It is about that. It is well in balance, but the bulk of the expense is paid for by the British taxpayer. Is not that a good basis on which to have an industry?

(*Dr Richards*) That is assuming that each and every company has a significant income from the British pharmaceutical market. I cannot question the 60:40 figures that you gave to me, but I will tell you that the UK pharmaceutical market is either

third or fourth worldwide, and it is perhaps only a fifth of that in the United States and probably less than a third of that in Japan. That would suggest a ratio which is greater than 60:40.

*Lord Kearton*

123. We did an inquiry about five years ago on the trade situation, and there was a great forecast there which unfortunately has come true. One of the things which struck us then was that many large companies in Britain, and some of the most innovative companies, were doing an increasing amount of their investment overseas and not in this country. We noticed this trend, for instance, in ICI. If you look at the recent figures, you now find ICI is doing more and more investment overseas and in fact is doing less than half its investment in this country and so on.

If I may say so, Dr Giachardi's company has made a lot of recent announcements about investment overseas. If all the big, progressive, innovative companies increasingly concentrate their investment overseas, how is Britain going to get back its innovative lead?

(*Dr Richards*) I believe this is true amongst many of our major companies, and ICI certainly is.

124. They are the strength of the country, our major companies.

(*Dr Richards*) Yes, they are. I think it is a matter of great concern that they are finding it necessary to put so much of their investment, and particularly investment in innovative capability, outside the United Kingdom.

*Chairman*

125. Why do you think that is?

(*Dr Richards*) I really cannot give you a considered answer. I know of a number of individual instances where one can quote a particular area of technology which is better sourced in another country, and that may be, of course, for other reasons because we just have not kept up in a particular field in our universities or our research councils. I am not being critical of them, I am merely saying they cannot do everything. So there are particular special pleading reasons why they might go abroad. But I am very concerned, as you are, about the balance.

126. But has the CBI got any view on this problem?

(*Dr Tidd*) There is no single policy line because in certain sectors, for example in pharmaceuticals, UK companies are investing overseas. But conversely in other sectors there has been significant investment within the United Kingdom, specially in preparation for the Single European Market. On balance I am not sure which way things are going. This is indicative of the internationalisation of R & D and production generally.

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127. Is the CBI at all concerned at the amount of investment being made of this kind overseas rather than in this country?

(*Dr Tidd*) Clearly it depends on what grounds the decisions are made. If it is to capture overseas markets, clearly that is a good case; but if it is simply to exploit conditions overseas in preference to those in the United Kingdom, it suggests it is a problem of the infrastructure in the United Kingdom. But that does not seem to be the case. There is no clear evidence from our surveys that companies are relocating because of problems in the United Kingdom. It is more because there are unique opportunities in other countries and the opening up of new markets. To come back to the Japanese case, that is why the Japanese are investing in the United Kingdom and Europe, to be closer to markets.

*Lord Whaddon*

128. In paragraph 2 you talk about the balance of payments and you say the United Kingdom and the United States are the only two with a positive balance, but these are relative figures. Do you have any absolute figures to guide us?

(*Dr Tidd*) Absolute figures are published by the OECD. I do not have them to hand. From memory, I think, for example, Japan—this is a classic case—overtook the United Kingdom in absolute terms several years ago in net output.

129. I am particularly interested in Germany and the United Kingdom.

(*Dr Tidd*) I am not sure.

*Lord Whaddon*] In some ways they are more closely parallel to us.

*Lord Taylor of Gryfe*

130. You talked about the sources of information, the bought-in licensing arrangements whereby you buy in a technology as an inexpensive way to develop a product. We have talked about internal development of resources, motivating people and so on. We have not talked much about the universities as a source of innovative invention. I wondered if our friends had anything to say about the relationship between the technical university and industry. Is it a satisfactory relationship? Is it a productive relationship? Can you produce companies that have benefited not only from product development but from the new relationship? You go very strong on management and motivation. I am thinking of the contribution of universities in the area of management and skills. In that area is there a relationship that can be developed? Is it a happy one, a good one, a big enough one?

(*Dr Giachardi*) I think in general there is nothing wrong with the relationship between major companies in this country and universities, that a lot of effort is put in by a lot of people to manage the coupling, and that that is true on the technical side

and, where appropriate, on the managerial side. But I would emphasise the technical side. I think there is a lot of effort put in to manage the coupling. I think that if there is a problem it is the way in which the universities have perhaps been neglected by some of the funding authorities which is a separate problem which industry is doing its bit to try and remedy. If I may, since Lord Kearton raised the point about my own company a while back and I did not want to lose it—it is a company I currently work for and he had a rather distinguished connection a few years ago!—the reason that we have moved some of our investment outside the United Kingdom, in terms of companies we have acquired and manufacturing investment on “green fields”, has I think two lessons behind it. The first is that, clearly, and there is an element of self-fulfilment in this in that one begins to look for dynamic markets to go to and, if one sees a market that is more dynamic than the United Kingdom market, one will tend to go there. So there is the element of a vicious spiral. There is a separate element which is where the duties of somebody such as myself in the sense of being a director of a publicly quoted company in the United Kingdom, quoted on the Stock Exchange, are slightly at variance with the interests of the CBI, in that my duty is to shareholders, not to the United Kingdom economy, United Kingdom Ltd. We are actually doing slightly different things. So if as part of that driving force there is a requirement either to spread risk between economies, for whatever reason, or to go to more dynamic economies, that is the reason we do that.

*Lord Kearton*

131. That is very clear and Dr Giachardi's answer is what I expected. You have a paradox. Figures published the other day show outward investment in this country last year was just under £40 billion and inward investment was just under £20 billion. The inward investment, as has already been said by Dr Richards, is because the Japanese see an enormous Common Market on the doorstep and they are coming in to invest in this country to take advantage of that there is a certain irony in the fact that we seem to be investing overseas—not much in Europe, nearly all in America. Why is that paradox there? Some people say the Common Market (we have had committees sitting in this House for years, and we are convinced of it) is going to be the dynamic growth centre of the future. The Japanese seem similarly convinced. The other area to rival it is the Pacific Rim. So why is this country concentrating on America when America itself is in trouble?

(*Dr Giachardi*) There is a whole range of answers to that. I think there is a mind set that regards the United Kingdom as a very small island whereas many of us actually in business regard Europe as being the home market. Although one talks about—and I take cognisance of—your macro-economic numbers which I do not have at my fingertips, we tend to think currently of Europe as one market, but



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one tends to look at the United States as a more dynamic market in certain sectors. One of the things we have put effort into is the aerospace industry which is active there, but also in France, and we also have efforts there. I think one also has to take from my own company's perspective an issue of scale of resources in that, yes, the Pacific Rim is there and we are putting investment down in some of our industries in countries in the Pacific Rim—Korea, Singapore, Taiwan spring to mind—but there is a limit to the rate at which one can actually do it.

Lord Kearton] Really the key thing Dr Giachardi said a little while ago is one we ought to consider, that is, being in innovative countries. In this country their duty is to their shareholders and not to the British balance of payments. That is what you said?

*Chairman*

132. I was just going to ask him a similar question in a very slightly different way. You seemed to imply just now that what was good for your shareholders was not in the best interests sometimes of the United Kingdom economy. That is a very important point. I do not want to tie you to your own company to embarrass you but it is a very important issue, as Lord Kearton said. If that is true, have you any ideas as to how we could make the two interests coincide? As long as they diverge the future does not look very bright.

(Dr Giachardi) I forget your words, but I did not say they were incompatible, I said they are not quite the same objectives.

133. Not very far apart.

(Dr Giachardi) That may or may not result in conflict. It is an observation I would make about many of our national institutions that relate to industries which are now inherently international. I am moderately active in the UK Chemical Industries Association and the Royal Society of Chemistry which are nationally based. Because we are inherently a chemical-type company and most of the chemical industry is international, there are divergences between what we want to talk about. You will see people will very parochially talk about the problems of the supply of manpower in the UK, or what is going on in the universities or whatever, when in fact it is an international problem and you do really need to look at it more broadly than that. I do not have a solution, I just make the observation.

*Lord Taylor of Gryfe*

134. Is there a conflict between the interests of the UK and the interests of the shareholders? A prosperous company depends on its ability to market and produce a product that is marketable, it seeks the best market and thereby improves the economy of Britain. Somebody said that "What's good for General Motors is good for the United States." I believe that you cannot say that your investment policy in a boardroom is necessarily

"We've got to invest here because it's good for the UK, and therefore our shareholders may be disadvantaged." I do not really think there is a basic conflict. A prosperous company in the UK requires to exploit every marketing opportunity worldwide, in the interests of its employees and its shareholders and so on.

(Dr Giachardi) If I may make a couple of observations, I think the quote about General Motors that "what was good for General Motors was good for the US" was made at a time when the US was a much less internationally traded economy than it now is, and therefore you had a much more closed system. The reality is that we operate in a much more open system. The second thing is that if I said that there was a conflict, I would apologise for that. I thought I avoided it. I said they are not the same objectives. There may or may not be situations where conflict arises, but if you are running the UK economy, then clearly an issue is how much wealth generation you can bring to the UK or how much employment you can bring to the UK. If you are running an international publicly quoted company, then that is not necessarily high on your list of objectives. So I avoided the word "conflict". I said that they are not necessarily the same.

*Chairman*

135. But the UK economy is the integration of the manufacturing side, all the manufacturing companies in it. If the majority of manufacturing companies are trying to increase their turnover and sales, then the overall output of British manufacturing industry will obviously go up, but if the majority of companies are saying, "What we want to do is to maximise our profits in the short term, not by making the maximum quantity but by the maximum return on capital employed in the short term," then we shall never achieve an increase in total output of British manufacturing industry. Is that a fair statement?

(Dr Giachardi) I think you have, with respect, confused the issue of timescale with the geographic issue. That brings you in a way to the expectations of the UK capital markets. I think it is the case that UK based manufacturers will have activities overseas and they will not necessarily think about the effect on the UK economy as the first issue in their thinking about their investment decision. That is different from if you were running UK as a closed economy, which is clearly not what is happening at the moment. That is different from the timescale issue which you brought up in that comment, my Lord Chairman.

*Lord Chorley*

136. Presumably Japanese companies adopt exactly the same attitude vis-a-vis Japan?

(Dr Giachardi) Yes.

Chairman] Could we pick up Lord Chorley's point about output, because I am not sure that is accurate. The Japanese driving force is market share,

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then after that they make their profits. Surely ours is the other way around; ours is: make the profits, and if we get some more market share, that is fine.

Lord Gregson] The Japanese have another driving force, and they have said so categorically. They are now ashamed of their market share and they have got to do something to redress it, they cannot go on.

Chairman] They have been too successful.

*Lord Taylor of Gryfe*

137. I asked a question about universities and their relationship to industry. We were somewhat sidetracked. Would anyone care to answer that general question?

(*Dr Richards*) I am very pleased to answer that question, because I happened to chair a group which was originally set up by the DTI and the Science and Engineering Research Council in the field of biotechnology, to combine their resources which, up to the end of last year, had been very successful individually in stimulating productive interaction between university people and industry. The DTI had concentrated on the more near-market areas, and the SERC had concentrated on the earlier discovery areas. Biotechnology is a growing activity. All our research councils have an interest in biotechnology research, because some of them want to see actual developments come out of that research. Suffice it to say that the Biotechnology Joint Advisory Group has as members DTI and SERC, but recently the NERC and the AFRC have joined, and the MRC is keeping a watching eye on what is going on. What we hope will come out of this is a further consolidation of good working relationships and productive relationships between the universities and the industry, and to be spread right across the areas which all the research councils between them are concerned with. So we are hoping that in biotechnology we will be leaving no stone unturned for opportunities for good, productive co-operation between those two sides.

*Lord Kearton*

138. My Lord Chairman, I am very encouraged by what Dr Richards has said. It is true that biotechnology is still a very new industry, it is very much a baby industry, in a sense, and it is making good progress, is it not?

(*Dr Richards*) Absolutely.

139. Speaking from memory, I think the total support by British industry for British universities is now running at about £50 million to £60 million in the last year. It has doubled in the last two or three years, but it is still absolutely trivial compared with the means, is it not?

(*Dr Richards*) Quite.

140. I wonder whether the CBI recognises that unless something is done by industry—as Mrs

Thatcher herself keeps on saying—to support the universities more aggressively, then in five years' time or so there will be very few graduates coming out of the universities, because they will be collapsing due to lack of funds?

(*Dr Tidd*) There are several issues in that question. One is that we have an insufficient supply of qualified manpower, which we are aware is a serious problem.

141. And it will become worse, will it not?

(*Dr Tidd*) Yes. Secondly, we have the issue of collaborative research with industry. These are two separate issues. On the first issue—the supply of qualified manpower—this is an acute problem and it is getting worse, but again as Dr Giachardi noted, it is not a UK problem, it is not a European problem, it is a global problem. In the US and in Japan they have a shortage of graduates in relevant technically qualified areas. On the second issue—that of collaboration—the CBI survey suggested that things were improving dramatically. There is a strong trend towards more collaborative research. There is a strong trend coming out in our surveys and also in recent surveys by the Centre for the Exploitation of Science and Technology, that industry is moving more and more towards collaborative work; in many cases they simply cannot do the work on their own any longer. Product life cycles are shortening, so industry is increasing collaborative research, and UK universities, polytechnics and higher education institutes in general are benefiting from this. I agree, that over the last two or three years, investment in HEIs by industry has doubled, and perhaps it is not enough, but the trend is encouraging.

Lord Kearton] Delete the “perhaps”! It just is not enough.

*Lord Gregson*

142. There is another factor here, in that of course you do not get any money out of the DTI unless you do collaborative research, and you do not get any money out of Brussels unless you do collaborative research, do you?

(*Dr Tidd*) True.

143. So there is another driving force, and it is cash, is it not?

(*Dr Tidd*) Yes.

(*Dr Giachardi*) I wanted to make a couple of comments on that, because the inference was that the amount of money going from industry into UK universities was small and therefore ought to be increased. I think we ought to look at the totality of the supply of funds to the universities, and what it is they should be doing. I would argue that the principal role of the universities is the supply of qualified manpower and the maintenance of the It is not immediately clear to me that supporting that is the role of industry as opposed to the role of government. I think we can then have a separate



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issue which is using industry in some way to help universities by sponsoring research and funding some of their departments, but I would argue that the majority of the role of looking after the universities is actually government's rather than industry's.

*Lord Kearton*

144. It seems to me, my Lord Chairman, that government is sitting on one stool and industry on the other and if we are not very careful the universities are going to fall down between them.

(*Dr Giachardi*) I agree that is the risk.

*Chairman*

145. You say that "relatively little use is made of the services of public laboratories", which is a slightly different issue from universities. In your paragraph 4 you say that "Government support for innovation has become less effective". Those two statements are both important. I would like to broaden it a little bit in regard to the subject we are investigating. What needs to be done to increase the resources devoted? Of course, we all recognise primarily it is a job for industry. What in your view, the CBI's view, can the Government do to give greater incentives to management, for instance, or in other ways to which these questions are relevant to help the innovative process along and create more of it, so to increase the turnover of British industry?

(*Dr Richards*) There are some concrete things the CBI are actually doing.

(*Dr Tidd*) Firstly, we recently completed—it is soon to be published—a review of DTI support under the Enterprise Initiative and in particular the technology components of such support, and Dr Giachardi chaired that working party, so perhaps he is the best person to outline the findings. Then we can perhaps move on to the more general issue of incentives to innovation. These are two separate things. So can we first look at the DTI support and then examine the wider issue of incentives to innovation. Broadly speaking, these are either cultural or financial; what is the experience of transplants from the United States and Japan, have they been successful?

(*Dr Giachardi*) It is about six or nine months ago that the CBI set up a small group to review the workings of the Enterprise Initiative and the way it was affecting innovation in industry. I chaired a very small panel of CBI people and we were assisted by a secondee who worked full-time on the project and the report is going to be published in the next week, and I suggest it should be submitted to this Committee rather than my trying to read through the conclusions now because it is a document of some 40 pages.

146. You will let us have a copy?

(*Dr Giachardi*) It has not been published yet. I think at the end of this week or next week I will get

it submitted to you from the CBI. It tries to reflect the attitudes of members of the CBI, both small and large, on the way they perceived the technology aspects of the Enterprise Initiative to be working along with recommendations on how it might be changed —

147. Time is short.

(*Dr Giachardi*) — rather than reading my submission.

*Lord Kearton*

148. Give us a two-sentence summary, if you could. Good or bad?

(*Dr Giachardi*) Like the curate's egg, good in parts and bad in parts. There is need for simplification. There are some specific recommendations on the way in which small companies could be helped. I think this is where you see the dilemma of an organisation like the CBI. There are recommendations for small companies who want much more direct assistance and for larger companies who would say that the money would actually be much better off put into the education system.

*Lord Gregson*

149. Would it be worth asking the question, therefore, do you think the Enterprise Initiative is going to turn round the direction as far as solving the problem of our balance of payments?

(*Dr Giachardi*) If you want a personal view, the answer is no.

*Chairman*

150. Could I reframe Lord Gregson's question slightly? Do you think it will make a significant difference to the question we are addressing about balance of payments?

(*Dr Giachardi*) If I may answer the question on a purely personal basis, not as a representative of the CBI or my own company—no.

*Lord Gregson*

151. The Office of Technology Assessment in the United States Congress has just published a report on the subject we are discussing this afternoon and —of course, America is in a hell of a mess—they agree with the Secretary of the Treasury that short-termism is ruining America, it has to stop, then go on to conclude that there is no way that American industry can be rescued from its downward spiral without fairly massive government intervention. In other words, they are suggesting that the DOD, which is the main provider of research support in the United States, should become a national agency and its funding should be trebled or even multiplied by ten in order to give an injection into American industry to attempt to turn it round. Have you seen that report as yet?

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(Dr Tidd) No.

152. The CBI do not look for this sort of thing?

(Dr Tidd) We do, but they take time to get to us.

Lord Gregson] It was publicised some time ago. Do they not really talk good sense? Can you see any other way in the time that we have got of turning round British industry other than massive assistance?

Chairman] May I suggest, rather than pursuing a report which none of you in the CBI have seen, that we ask you to study it and let us have the considered opinion of the CBI as to whether you think that recommendation would have relevance to the conditions in which this country is in so far as the output of industry is concerned?

Lord Gregson] I would have thought we could have their opinion now, my Lord Chairman.

Chairman] They have not seen the report.

Lord Gregson] That does not matter. The report merely —

Chairman

153. Would you like to make a comment now?

(Dr Tidd) I would make the point that the United Kingdom economy is not the same as the American economy by any stretch of the imagination. The problems are different and the opportunities, given the European market, are very different as well. The recent CBI innovation trend survey is much more bullish than similar surveys in the States, although I stress this survey was conducted in September before the recent increases in interest rates. That is only one factor that has changed. We have —

Lord Gregson

154. Is it not possible that the Single Market in 1992 could be an even bigger disaster?

(Dr Tidd) It is an opportunity. It is also a threat, yes.

Lord Gregson] It might be a disaster, not an opportunity.

Chairman

155. Let the CBI —

(Dr Tidd) Was the suggestion that the government should make a direct investment and, therefore, pick winners? It is that suggestion —

Lord Gregson

156. R &amp; D.

(Dr Tidd) In what areas, what sectors? This is the problem. The American experience does not suggest they are any better at picking winners than the United Kingdom Government. The CBI believes industry is best at this. It has a chequered history, I admit. The government role is to create an environment in which industry can make appropriate investment decisions, rightly or wrongly.

Chairman

157. Let us leave that and ask you to let us have your considered comments on this report. I would like to ask a general question on the attitude of government and the contribution of government. Do you think it would help the overall picture if the Government came out firmly and clearly with a statement that the increase in output of manufacturing industry was of prime importance in solving some of our economic problems?

(Dr Tidd) I think we answered that point earlier in the discussion. It is not absolute output, nor absolute demand. It is in which sectors, which markets, that demand and output are increasing. I admit existing exports may not be sufficient to redress the balance of payments deficit —

158. With respect, that is a politician's answer. It is answering a different question. The question I was asking was, does the CBI believe that, as just suggested, the Government might help the totality of output of British manufacturing industry to increase so as to help our balance of payments problem?

(Dr Richards) Chairman, if I were to presume to put words in the mouth of John Banham—who does not actually need that help very often—I should say that he would agree with that statement pretty wholeheartedly, and I personally would agree with it. How you actually implement that sentiment is another matter.

159. I believe, as I think members of the Committee do, that is the first step, then get round a table and see what we do about it.

(Dr Richards) I think that would be a very significant first step.

160. Thank you. Perhaps we could turn to public laboratories. I think that the broad trend of government policy at the moment is to cut down on government-funded laboratories and say that near-market research should be done by industry, therefore there is less need for such laboratories as the National Engineering Laboratory at East Kilbride and the like. Does the CBI have any views on this?

(Dr Tidd) I think the original question referred to the declining use of government laboratories as indicated by our trends survey. I think that again we have answered our own question. There is a trend in the UK to privatise near-market research establishments or near-market research activities. Therefore, almost by definition, as those enter the private sector the remaining public laboratories are less relevant to the needs of industry and are essentially serving the needs of Government.

161. Does the CBI think that is a good policy?

(Dr Tidd) We do. To give an example, AEA Technology on 1 April become a private company,



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and are sponsoring the CBI's Investment in Innovation Jubilee Programme this year. They are moving into the consultancy business as a research and technology organisation, becoming an AIRTO organisation, and therefore will strengthen research in the private sector, and freed from the constraints of public sector requirements.

162. So it is the CBI view that government-owned research laboratories should only continue where they serve a government need?

(Dr Tidd) Near-market research is best conducted in the private sector.

Lord Kearton

163. There was a phrase which Dr Tidd used which I would like to take him up on. He talked about consultancy and, was it, the AEA?

(Dr Tidd) AEA Technology are becoming an independent research and technology organisation.

164. If one looks at the general developments in this country over the last ten or 15 years, one sees that a massive feature has been the growth of consultancy. With all this consultancy, how is it that our performance is so lagging behind all our competitors?

(Dr Richards) If I may try to answer that, I believe that a great deal of what you see now as the consultancy industry is not really very high-level consultancy. A number of people who have not been very successful in operating in manufacturing industry set themselves up as consultants. I think you have to be very careful about whom you actually get to act as a consultant for you or your corporation. There are very good consultants, but I would say they are in the minority.

Lord Gregson

165. If you resort to consultancy, I personally do not think you are looking for a solution.

(Dr Richards) That is right.

166. On a serious question, is it a fact that the growth of consultancy as a reciprocal of our balance of payments is indicative, do you think, of the situation?

(Dr Richards) I would not like to say there is any strong relationship between the two. Our view of consultants is that if you employ consultants to come and tell you the time, they have usually borrowed your watch in order to achieve that! However, consultancy by those people who are expert in an area in which you do need firm advice and guidance—and that will include people in universities, in industry and some in the private sector consultancy industry—is very valuable, but I do think you should use it very judiciously.

Lord Kearton

167. I was fascinated when Dr Giachardi talked about his own background. I must say, I have a great admiration for you, Dr Giachardi, you are a remarkable man, but you did say that you started life after university as a consultant and that it was only after you had been a consultant for many years that you actually went into industry. Should not it be the other way around?

(Dr Giachardi) It was a very specialised form of it. I joined the particular organisation as a trainee and worked my way through the ranks, so to speak. It gave me an enormous personal training, and I think that that organisation has contributed significantly to the betterment of several organisations in the UK. One comment I would make about the growth of consultancy is that it is actually a manifestation of the way in which the cost structure of companies is changing, and increasingly they want to buy in services rather than to have their own permanent staffs. It is a way of shifting the cost structure from fixed costs to variable costs. That is a trend which is not just affecting consultants but all sorts of other services. That is, that large companies who used to have very large staffs of people doing these things have essentially closed down their central staff departments and now buy in the service. So I think there is a change in the cost structure of industry.

168. If a company were buying in an absolutely superb service from someone who was doing it much better than they could do it themselves, it would be extremely sensible, but Dr Richards' answer implied that that was not the case.

(Dr Giachardi) He was not talking about the firm I was talking about! Perhaps I can make a short comment about public laboratories. I think there is a dichotomy in policy between the near-market work which should be done in the private sector and the things that Government needs doing. Those should be done by public laboratories, but they need to be very clearly thought through as to what Government needs to do. Above all, though, they need to be managed in a way which does not lead to the very low morale that you currently have in those of the government laboratories that I know. That is not a total sample, admittedly, but in the ones I know the morale is very low. Therefore, the quality of people who will be retained in those will decline, and if we are not careful, over a period of time, we will effectively be living off technological capital, if you like.

Chairman

169. The reason for that low morale is because Government has cast doubt on the value of the government-funded laboratories. May we return to your paragraph 4 where you say: "The CBI survey suggests that Government support for innovation has become less effective." Are you concerned about that, or is it just a statement of fact?

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(*Dr Tidd*) There is concern. That statement was derived from the Innovation Trends Survey. As I outlined earlier, we have recently completed a more detailed review of government support for technology. That report will be published very shortly, and of course we will forward a copy to the Sub-Committee.

170. So this was just a statement of fact, and you will cover that point in this report which you are going to let us have?

(*Dr Tidd*) Yes. It examines the particular features which could be improved.

171. Could we pass on to a slightly different area. To what extent are UK suppliers becoming an integral part of the customers' new product development processes? To what extent is the inability of suppliers to provide rapid and high-quality service of components and the like, to companies that are trying to innovate, a constraint? It is often said that that is something that the Germans, for instance, are very good at, and even the Americans.

(*Dr Richards*) If you take the example of Jaguar before the recent event, they looked very carefully at sources of UK suppliers for more innovative and particularly reliable components for their current range of motor cars. They chose some components from Japanese suppliers. Their new model was criticised by its new owners very much from the point of view of poor performance of these electronic components. They have revised that model now, and I do not know where they get the components from, but certainly the situation has improved. It is a case of an industry having to go outside its immediate area of technical capability in order to have very specialist equipments supplied which then become an integral part of their product. I believe that you can only manage that by having a very close integration at all levels between the designer of the main product and the components which may be going into it, so I think that it is probably an example which ought to be followed by all UK manufacturing industry in making very judicious decisions about how best to get that integration with their suppliers to ensure that that product meets the quality standards that they claim for it.

Lord Kearton

172. Again, it is a point which the Japanese do so thoroughly, of which you mention an example, I think, in your note of a Japanese electronics manufacturer who told their existing supplier that in fact their quote for a new component was too low and that they were not giving themselves sufficient margin to support continuous development of a new component. All the investigations we did into Japanese companies in Japan showed that the final

product was designed with the component manufacturers as part of the team, not designed in-house and then going out to find someone to make it.

(*Dr Richards*) As is well known, Sir John Egan did just that. He put quality standards on his suppliers to ensure that he had no hold-up in his own production continuity as a result of failure of batches of components.

Chairman

173. Some companies in the United Kingdom—Marks & Spencer, Rolls Royce—take great trouble to give suppliers advance notice of what they want so that they can be ready to supply it when the main company wants it. The CBI believes that is important and that if that procedure can be expanded it will be of great value. What is the CBI doing about it?

(*Dr Richards*) We believe we are taught from the examples of the companies you mentioned to the extent that we, the CBI, would certainly wish to see that philosophy throughout the whole of British manufacturing industry.

174. You would believe that would make a valuable and very useful and significant contribution to increasing the output of manufacturing industry and —

(*Dr Richards*) I go further. It would probably make one of the most immediate helpful impacts on British industry.

Lord Taylor of Gryfe

175. Could I give a quick example of the Marks & Spencer relationship. I was chairman of a company that had a textile mill that was a large supplier to Marks & Spencer. They came to us after a year or two and said "We are quite happy with the quality of merchandise but we like our suppliers to be successful and content in meeting our needs. Would you mind if we put a couple of production engineers into your factory because we do not think you are making enough profit on our product?" And they put a couple of engineers in and improved our productivity. They said, "We are not quibbling about the price. Quality and price are right for the market, but we want to have a successful and contented supplier" and they actually assisted—free of charge—our productivity and made us a more successful company and a happier supplier. It was complete integration.

(*Dr Tidd*) This is one of the recommendations of the CBI report on government support, that the relationship between large and small companies be improved, for example, by the secondment of staff from large companies to their smaller suppliers. So this is recognised as a crucial feature of innovation.



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*Chairman*

176. Does the CBI think there is a significant problem in that we are not good enough or do not take enough trouble to find out what our customers and potential customers are going to want in the sort of way the Japanese do? I remember being told once that the Japanese oil industry went round taking samples of oil used all over the world by various people and then put it into their marketing plans and supplied it.

(Dr Tidd) I think increasingly suppliers of intermediate goods are being forced by these relationships to innovate and improve their quality, particularly in the United Kingdom. But if there is a failing in the United Kingdom it appears to be in the relationship between producers of consumer durables and the ultimate consumer. Again we have to look at different sectors. In the intermediate products sector there is a real trend towards higher quality and performance as a result of specifications of major customers, but I think in the case of consumer durables there is still a problem and this is reflected in the changes in the industrial structure in the United Kingdom.

177. In general you say we have much improved in that respect?

(Dr Tidd) Definite improvement.

178. Obviously there is more to be done. It is not major.

(Dr Giachardi) If one's company is largely an intermediate supplier, one's ideal work is where you have an innovative upstream supplier and an innovative customer. That is the easiest way in which you can innovate. Unfortunately that sometimes leads to one going outside the United Kingdom. That is the downside of it. If you can do it in the United Kingdom, it is much better.

179. If the main company gives adequate notice and attention to suppliers, it is less likely to have to go outside the United Kingdom?

(Dr Giachardi) Exactly so.

180. We had some witnesses from PA Consulting the other day who seemed slightly at variance with you as to the balance of spending on manufacturing technology and product development. Would you like to comment?

(Dr Tidd) I am not familiar with the PA report to which you refer.

181. They made that point.

(Dr Tidd) If it is the report which I have seen, which I think was conducted and published last year, it did not examine absolute levels of investment in product or process innovation, but rather the impact

on profitability. The questions differ. We examined trends in investment intentions, whereas I believe the PA report asked for the impact on profitability. Having said that, the CBI survey showed no significant difference between product and process innovation: 52 percent of companies we surveyed had intentions to increase investment in product R & D; 41 percent in process R & D. That is not a significant difference given the size of the sample. So this is not a point of contention. But I think the most important point was made in the written submission, that there is a trend in many sectors towards simultaneous engineering of project and process, which is related to the changing supplier-customer relationship. The example of the packaging industry cited earlier shows that we must not look at these in isolation. Increasingly product and process are designed together to shorten development times and costs.

182. I think we all agree the innovation process goes right from the design development to manufacture at a competitive price. So this is all part, as we see it, of the innovation process and you have to have investment across the board, otherwise you will not be successful. The right product made at the right price—I think we all agree on that.

(Dr Giachardi) Absolutely.

*Lord Kearton*

183. I ask this slightly tongue in cheek so you answer it how you think fit. I keep on hearing from Government spokesmen that we never had a more efficient, leaner, more aggressive, more competent industry in our history, and many of the statements from the CBI go roughly along the same lines. I must say, after the evidence given this afternoon, I find it difficult to say I am absolutely convinced.

(Dr Richards) Well, I would agree with Lord Kearton. I do not think that we should feel convinced that we have the leanest, meanest and most effective industry. I think in touching on various aspects we have all found there is plenty of room for improvement. I think that goes right across the board. Elsewhere you have individual companies which are very successful. Take the quality issues, the Marks & Spencer approach. I believe that those give very clear guidelines which can be applied right across British industry.

184. You are going along with Lord Gregson to some extent. Would you agree that unless we get on with it very, very fast indeed our situation is likely to deteriorate in relation to our competitors?

(Dr Richards) I have to agree with that.

*Lord Gregson*

185. If you read Kenneth Cork's "Roads to Carey Street", companies must keep their eye on the bottom line. That is really saying the balance of

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payments statistics are the absolute and there is no way you can avoid that. So British industry must be wanting, must it not?

(Dr Tidd) I make the observation that in the past few years British industry has made significant gains in manufacturing output and productivity, but these are not the only measures, I think we all accept that.

186. Over that period of time the balance of payments has deteriorated at three times the rate ever before in history, so it is not compatible, is it?

(Dr Tidd) It is compatible because the profits have to be reinvested in productive capacity. Innovation is a long process. The last three years

Lord Taylor of Gryfe

187. Would not the balance of payments situation be much worse if it had not become leaner and more effective?

(Dr Tidd) Yes.

Lord Gregson

188. It was all right before.

(Dr Tidd) Well—

Lord Taylor of Gryfe] We are living in a new competitive environment.

Chairman

189. I have one or two more points I would like to cover. To what extent do you think environmental regulations—meaning environmental in the broadest sense, the Health and Safety at Work Act, pollution requirements and the like—are significant factors in deterring investment in innovation relative to other countries?

(Dr Giachardi) I would think there is a special case, which I will not dwell on, for the industry Dr Richards represents. I think with regard to the sort of industry I come from it does not deter innovation. I think it affects the way in which the innovation process operates, and we have already talked about the shift from a sequential process—developing a product and then deciding the manufacturing process—to doing those things increasingly simultaneously. It is my judgment that what is happening now—and has been happening for some time in fact—is that such issues as you mentioned in terms of safety, be it product safety, process safety, environment, are just factored in earlier during the innovation process. It changes the process rather than inhibiting it.

The one place where it does get very difficult is that if you look at the cost of doing research and development per unit of output, however that is measured, it is increased by the various regulations one has to obey. That is probably an inevitable cost, given the increasing knowledge we have about the hazards of substances. So I think it is just an increased cost of doing research—one of many.

Lord Gregson

190. But it is no worse here than it is for our competitors, is it?

(Dr Tidd) This is the point to be made. If the trend is global then it is no problem.

191. I happen to be a director of a German company, and I assure you, if you think you have got a problem, it is much worse in Germany.

(Dr Giachardi) But the rate of change is something which is worth dwelling on. We now handle materials which we only handle in fume cupboards with chaps wearing protective suits and breathing apparatus and which, when I was doing a doctorate, we almost washed our hands in! That rate of change is very dramatic.

Lord Taylor of Gryfe

192. We have created a new industry in control of pollution and waste management and so on. It is a new market; it is a world market. Do we respond to that new market with innovation, invention and efficiency, or are our competitors better than us? I suspect we are better at it.

(Dr Giachardi) I do not know that I can really form a judgement on that, I am sorry.

Chairman

193. On another more detailed question, at the very beginning you said that one of the constraints to innovation was cost of capital, cost of money. Are there significant differences between large and small firms in that respect?

(Dr Tidd) We have not disaggregated the data from our Innovation Trends Survey. We hope to have the results in the next few days, but I suspect that there will be a difference, and that, given the preliminary analysis, the high cost of capital is affecting smaller companies much more quickly than larger companies. I do not know ultimately whether there will be a difference, but in the short term smaller companies certainly appear to be feeling the squeeze.

Lord Chorley

194. Is not this just a short-termism problem over the last three years?

(Dr Tidd) The cost of capital has increased significantly.

195. In the last three years, yes, but if you look over the run of years, over the last 50 years or whatever, this innovation programme goes back over 100 years.

(Dr Tidd) But again, this must be compared with international competitors; in absolute terms, it has been lower than in Italy.



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196. But is it in relative terms? Over the last 20 or 30 years has our cost of capital in real terms been lower?

(*Dr Tidd*) In real terms, compared with our major competitors, I think you will find the cost of capital has been higher in the UK at most times.

Lord Gregson] Certainly far higher than Japan and Germany, and it has been for many many years higher than Germany.

Lord Chorley] It was negative in this country for most of the 1970s in terms of debt, in real terms.

Chairman

197. It makes the justification of the expenditure more difficult for managers vis-a-vis their shareholders, is that the point?

(*Dr Tidd*) It is not only that. In the case of small enterprises, that does not enter into the equation; if you like, it is simply the high return on capital required.

198. It increases the risk?

(*Dr Tidd*) It increases the risk dramatically for small to medium-sized companies. Increasingly the shareholder comes in —

199. So the CBI would attach very high importance to getting the cost of money down for industry?

(*Dr Tidd*) And stabilised as well, which is also important. If you are planning on medium-term to long-term horizons, which is the case with innovation, you must have stability. Interest rates must be both low and stable.

Lord Gregson] Surely it is not only risk. The cost of capital in Japan at the moment is high; it is 9 percent all up. The target return of 3i at the moment is about 40 percent, which is understandable. The viability of a project must be in doubt if you have got to talk about a seven-year cycle before you get a payback, on the basis of a 40 percent return compared with a 9 percent return, surely? Is not this fundamental?

Chairman] If I may say so, it is a slightly misleading question, because the 40 percent return demanded by 3i is only in cases where there is high risk for one reason or another, whether it is the long term of the project or not, in order to take care of those projects where there is no return because the whole of the money is lost. The overall return for 3i shareholders was about 18 to 19 percent.

Lord Gregson] Let us take a low rate, 25 percent compared with 7 percent in Japan. Does not the project viability come into doubt if you have that difference in financing costs over a seven-year cycle?

Chairman] With great respect, you are not asking the same question. The 7 percent is cost of money, the 25 percent is return on equity, which is quite different.

Lord Gregson] The cost in Japan until just recently was 3 percent.

Chairman] Would you like to comment?

Lord Gregson

200. Does not the return you are going to make on capital make a difference to the viability of the project?

(*Dr Tidd*) Naturally, that is what we are saying. The cost of capital is of crucial importance.

201. It is not only the risks, it is the actual sums you do, is it not?

(*Dr Giachardi*) If I may say so, I go back to the problem I mentioned some time ago about the conceptual understanding people can have of the innovation process. It is actually very difficult up-front to evaluate the risk of the project. We have all seen large-scale projects where it is impossible to calculate the risk. That happens right down at small levels. I think to assume it just is a straight calculation between risk and expected return is, with respect, a little simplistic, simply because the mechanisms for calculating risk I do not think exist in a satisfactory form.

Chairman] It is a big and important subject which we shall pursue on another occasion. Perhaps we might ask for some further discussion on this at a later stage in our inquiry.

Chairman

202. I would like to put one final question. We have had a lot of discussion on these points and are very grateful to you for answering them. One question to which we do want to address ourselves is what can government do to help in these matters? Accepting that it is primarily industry's job to undertake innovation, to find winners, to assess the market and all the things that Dr Richards said, what can government do to help? We have talked about public research, government research laboratories, training in universities, and things like that. I think it is quite clear we have talked about Enterprise Initiative which is not thought to have a very significant role. What more can we ask government to do to increase the incentive to managers, directors and boards of companies to go flat out for greater innovation and greater output, greater market share?

(*Dr Richards*) I will have to give a personal answer, I hope reflected by the CBI thinking. I would certainly like to hear what my colleagues say. I believe that we have some of the best in this country and we probably have many which are not so good.

203. The best companies?

(*Dr Richards*) Yes. I think if there is one thing that government could do it would be to stimulate the process of learning from how the best companies

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[Continued]

[Chairman Contd]

run their businesses, innovate and achieve individually a healthy performance in our balance of payments, to somehow enable British manufacturing industry in general to be able to learn from those lessons. Now, clearly, there is the possibility that that learning process might evoke the issues of confidentiality. I wonder whether government can still help to promote that, shall we say, intellectual technology transfer from the best to the not so good. That is one way I would feel is worth considering.

You would agree that what is difficult is the first requirement, for government to indicate and be determined that that is an issue of high priority?

(Dr Richards) Absolutely. I could not agree more.

(Dr Giachardi) I agree with what Dr Richards said, but I would make a slightly different point. You asked whether government could say that manufacturing was a "good thing" and whether that would help. I think anything the Government could do through its various agencies to encourage that belief would be helpful. We still have the legacy of the many years when manufacturing was thought not to be a prestigious thing to do. I think it is changing. I do not know how long that change will go on, but I think it is changing, and anything we can do in that direction will help.

205. We have not too much time?

(Dr Giachardi) Indeed.

Lord Chorley

206. You would not want the Government to go back to try to pick winners, though?

(Dr Richards) No. I think that innovation, first and last, has to come from the individual companies within industry. There has to be a spirit of competition right from the first concept through to the eventual product.

Lord Taylor of Gryfe

207. Is the quality of management training and management skills from our institutions and universities a factor in this situation?

(Dr Tidd) I would make one point based on anecdotal evidence. There is a trend—following the US example—toward more courses in management schools on the management of innovation, the management of technology, and the management of science. Imperial College Management School and the London Business School now both have specialists in innovation and technology management, and this is an encouraging trend.

208. I must say, I look at some of the universities who started management schools because they have partly got close to industry and therefore could attract more assistance to the university, their appeal would be greater, but with many of the universities

that I look at the quality of management training is not comparable with the best of our competitors, with one or two exceptions. I do not regard management schools as being efficient; their standards are not good enough by comparison. That is one area in which the Government creates, if you like, an infrastructure which could assist industry in improving the whole standard of management training. We do not have MITI in this country.

(Dr Giachardi) Perhaps I can make two comments. One was that I think you need to think very hard about the concept of management education and what you mean by it. We have talked a lot about the Japanese, and there is a situation where you do not find many people with the conventional MBA qualification as we recognise it, rightly or wrongly. I just make that comment as an observation. Secondly, perhaps I could pick up Dr Richards' argument in response to Lord Chorley's question about picking winners. I think you were meaning that in the context of picking industrial sector winners. There is a role for Government as it supports the science base, through its expert advisers, in deciding which parts of the science base to support. That *does* require an element of "picking winners", but it has to be done on a "recognising-that-you-will-not-get-them-all-right" basis.

Lord Chorley

209. That is not really innovation.

(Dr Giachardi) But I believe it feeds through eventually.

Chairman] It is a base for innovation.

Lord Chorley] It is a bit beyond our terms of reference to start talking about how the research councils operate.

Chairman] Yes.

Lord Gregson

210. Therefore, you have ruled out the sort of role that MITI have in Japan, in saying that "There's a world market that is ripe for plucking. Let's concentrate our efforts a bit on that world market. We'll help you, the banks will help you. Get on with it, lads." You write that out completely, do you?

(Dr Giachardi) I would say that our track record in the Western world of getting that right is significantly worse than the Japanese.

211. But is not the problem that of getting it right rather than doing away with it?

(Dr Giachardi) I would rather not use government and taxpayers' money to go down that route, given our poor track record of doing it, until we have found what the secret of success is.

Lord Chapple

212. Really, though, we have got no alternative but to try to combat it, surely? We cannot let MITI's operation go without challenge, can we?



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DR JOE TIDD, DR BRIAN RICHARDS  
and DR DAVID GIACHARDI

[Continued

[Lord Chapple *Contd*]

(*Dr Tidd*) A very important role, for the government—although parallel between DTI and MITI obviously does not exist—is in the intelligence and information gathering, not so much the direct financial support of innovation. I think that in *that* respect DTI could be strengthened tremendously in gathering information internationally and disseminating that throughout British industry. That is a role that DTI could play and which could be strengthened. But as to picking winners and supporting specific sectors, I do not think that historically we have been successful.

*Lord Gregson*

213. Do you rule out completely there being an operation like MITI in this country?

(*Dr Giachardi*) I would like to know how they have made it work before I said I would not rule it out. Lord Chapple] Get together, all sit down and say “This is what we ought to do.”

Lord Kearton] It partly works because they have complete collaboration pre-production, then cut-throat competition once they have decided to go into production, so you get guidance and protection allied with very severe competition. It is that combination that is the trick.

*Lord Chapple*

214. There are a number of issues on which the DTI have taken decisions directly against the interests of the industry in which they have been

involved and against the advice of the industry. I know of no instance where MITI have done similar things to that.

(*Dr Tidd*) Many times. The Japanese automobile industry and the Japanese electronics industry are full of examples where companies said “We don’t want to concentrate on this field” and MITI has said “Yes, you will”. Industry has sometimes taken the advice, sometimes it has not.

Lord Chapple] You have it the wrong way round. I am referring to industry where we are already where the Government takes decisions which prevent us from continuing, not getting in somewhere where we are reluctant to go.

Chairman] I think it is a very big subject and I think we need to come back to it on another occasion and see what we can learn from MITI.

Lord Chapple] One further point on the educational aspect, it seems to me from my little knowledge of Japan that the one great difference between their educational process and ours is that the Japanese education process is all about how great it is to be Japanese, whereas our education process is about how bloody awful it is to be English.

Chairman] On that happy note —

Lord Gregson] Even worse to be an industrialist.

Chairman] Are there any further questions for our witnesses? Thank you very much for coming.





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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 21 March 1990

DEPARTMENT OF TRADE AND INDUSTRY

*Dr R Coleman and Mr B Murray*

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WEDNESDAY 21 MARCH 1990

Present:

Caldecote, V. (Chairman)

Butterworth, L	Erroll of Hale, L
Chapple, L	Gregson, L
Chorley, L	Kearton, L
Clitheroe, L	Whaddon, L

**Memorandum by the Department of Trade and Industry**

1. This memorandum describes those activities of the DTI which are concerned with innovation in manufacturing industry. Innovation is essential to wealth creation; without continued innovation UK companies would cease to be competitive in world markets. However, the Government's main role is to create a climate within which successful innovative companies can flourish: it is for companies themselves to take the lead in developing innovative applications in their products and processes, and also in their management.

2. When the Government responded to the Select Committee's 1986 report on civil research and development (in the White Paper on 'Civil Research and Development' (Cm 185)) it announced that DTI was reviewing its role in supporting and encouraging innovation in industry. The main conclusions of that review were announced in January 1988 in the White Paper "DTI—the department for Enterprise" (Cm278) which described the role of DTI in encouraging enterprise and prosperity.

3. The central theme for DTI policies is that sensible economic decisions are best taken by those competing in the market place—this is as true for innovation as other business activities. The characteristics of such policies are likely to be long term rather than short term, tackling underlying causes rather than symptoms or problems in individual industries; working with industry to facilitate change rather than dictating changes from above.

**CLIMATE FOR INNOVATION**

4. The establishment of a favourable climate for innovation and business success is the most important role for Government. The climate is determined by a wide range of Government policies from taxation through to employment laws and including a strong science base in our Higher Education Institutions and Research Councils. A key indicator of the improvement in the climate is that manufacturing productivity in the UK grew in the 1980s faster than in all other major industrialised countries: over the previous two decades the UK was at the bottom of the league. The low rate of Corporation Tax in the UK of 35 per cent for large firms and 25 per cent for small firms leaves more resources within companies. This compares very favourably with our European partners and with that of other industrial nations.

5. For R&D expenditure itself, companies may claim for tax purposes the costs of R&D which are connected directly to the business in which they engage. In addition they may also claim a deduction for any sum paid to a scientific research institution, (e.g., a university), which carries out research on their behalf. Expenditure on equipment used for scientific research connected with a company's business qualifies for 100 per cent depreciation allowances (compared with 25 per cent depreciation allowances for other capital equipment expenditures).

6. The protection of intellectual property rights is an essential catalyst in the process of innovation. The Patent Office is soon to be launched as an executive agency of the DTI with a view to improving the quality and cost-effectiveness of the UK system for protecting intellectual property rights.

7. Since 1986 sample surveys of private industry R&D are conducted annually by the Government with benchmark enquiries every four years. The latest survey indicates industry's own funding of R&D has grown by 36 per cent in real terms over the five years to 1988. The agreement by the Accountancy bodies that accounts of public companies and large private companies should disclose expenditure on R&D, starting with the 1989 accounts, will help bankers and shareholders assess the value and advantages of R&D investment more readily.

8. The Department set up in November 1988 an Innovation Advisory Board (IAB) with representatives from industry and the City, to advise on broader issues of innovation policy. The IAB's study of City attitudes and practices suggests considerable scope for improvements in communicating the benefits of R&D—building, for example, on the new requirement to disclose R&D in company accounts—and raises questions over the pressures on fund managers to concentrate on maximising short-term returns. The IAB is particularly concerned that there should be greater awareness of the need to innovate more. A complement to such activity would be steps such as the forthcoming introduction of an "Innovation Tool-Kit" prepared by a NEDO (National Economic Development Office) Working Party with the participation of DTI.



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[Continued

## THE DEPARTMENT'S SPECIFIC POLICIES TO SUPPORT INNOVATION

9. The Department's policies and support activities which are likely to have the most significant impact in encouraging innovation in manufacturing industry are described in the following paragraphs under three main headings: innovation policy, the Consultancy Initiatives and other support for industry. Other Departmental policies—for example, competition policy and the Single European Market—also promote business enterprise but are not discussed in this written evidence as their impact is far wider than innovation as such.

10. The Department's policies are kept constantly under review and altered as necessary in response to changed circumstances. Where new spending programmes are proposed these are required to specify what is to be achieved, the timescales, and the cost to DTI. They must also have testable objectives against which progress can be regularly assessed. All significant spending programmes are monitored and evaluated so that the Department is informed about progress and value for money. In some longer running programmes, adjustments are made to take account of the lessons from monitoring and evaluation.

## INNOVATION POLICY

11. The Department's overall aim is to encourage innovation by industry without creating or perpetuating distortions in the economy. DTI's objectives are to encourage:

- industry to increase its own funding of R&D and to apply new technology more effectively;
- technology transfer with the translation of and access to both inventive capability and best practice techniques into commercial application;
- industry to make most effective use of its own and academic resources through collaborative research and development both nationally and internationally, especially within Europe;
- innovation by small firms, particularly in advanced technologies and in the regions.

12. As firms themselves are best able to assess their own markets and to balance the commercial risks and rewards of financing innovation, the Government will not take on responsibilities which are primarily those of industry. This is particularly so, the closer to the market place that innovation is taking place. However, the Government recognises that reliance on the decisions of firms may produce inadequate innovation for the maximum benefit of the economy. DTI's innovation support therefore focuses primarily on pre-competitive research necessary before commercial applications can be developed, or where the benefits of the research are likely to be widespread, and on technology transfer.

*Collaborative Research*

13. In January 1988 the general scheme for providing grant assistance for innovation to individual companies was ended; support is now through four collaborative arrangements (with up to 50 per cent support) aimed particularly at where technological risks are high:

*LINK* which encourages industry to undertake joint research with Higher Education Institutions and Research Councils. The research is pre-competitive but industrially relevant. Other Government Departments are also participating; across Government there are now 21 LINK programmes with 20 of these involving DTI, mainly falling under the four general headings of biotechnology, advanced materials, advanced manufacturing and electronics. Of the Research Councils, the Science and Engineering Research Council (SERC) is the major player and is involved in 20 programmes. The total value of LINK programmes agreed and announced is £294m (including both Government and industry funding); and total expenditure committed on the 50 projects underway (in mid February) is £28.9m, of which DTI is £9.8m and SERC £3.9m.

*EUREKA* helps strengthen European technological capability in world markets and contributes to the completion of the Single European Market by encouraging industrially led projects with European Community (EC) and other European partners. There are currently 297 approved EUREKA projects involving an estimated total investment of £4.2bn. UK firms and other organisations are participating in 86 of these with an estimated total investment of £1.1bn. In 22 of these projects the UK organisation is in the lead. To date the DTI has committed some £33m to 45 EUREKA projects, of which approximately £11m had been spent up to the end of December 1989. In the manufacturing field one of the major EUREKA programmes in which the UK plays a leading part is FAMOS which is concerned with the Flexible Automation of Assembly, a field of manufacturing activity where automation has made relatively slow progress. The programme involves 17 participating countries working on 26 EUREKA projects concerned with the assembly of a wide variety of products ranging from toys to CAD (Computer Aided Design) equipment.

*Advanced Technology Programmes (ATP)* support longer-term industrially led collaborative projects between UK companies in advanced technologies. The Programmes are often in new technologies which are likely to have an impact across a range of different industries, e.g., high

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temperature superconductivity. To date some eight Advanced Technology Programmes have been launched. These include the Information Engineering Advanced Technology Programme where the industrial appeal is such that the first general call for proposals was 10 times oversubscribed, and a second more narrowly defined call was four times oversubscribed. Sixty-five projects are now under offer in this ATP with an expected total expenditure of £75m/80m (for industry and Government combined). Since the Information Engineering ATP was first announced in the DTI January 1988 White Paper (Cm 278), planned DTI expenditure has risen from £29m to £34m.

*General Industrial Collaborative Projects* encourage collaboration through a variety of projects. They may involve Research and Technology Organisations which can pool resources to meet the R&D needs of fragmented industries with many small and medium sized firms; or they may be COST projects (Co-operation in Science and Technology) for European firms. Others may directly involve small and medium sized companies in collaborative projects which do not fall under the other categories of DTI collaborative support.

The provision for DTI expenditure under these four schemes is over £300m for the three years together to 1992-93.

14. *EC R&D programmes*: DTI actively encourages the participation of UK companies in technological collaboration with other European firms and research organisations through EC programmes as this enables UK companies to play a major role in shaping European technological capability. Collaboration involves sharing costs and risks, and provides access to new technologies and skills which are necessary if UK industry is to maintain its competitiveness in European and world markets.

15. There has been considerable growth in EC R&D in recent years and the value of support for collaborative R&D obtained by UK manufacturing industry through EC programmes is as great as that from DTI programmes. The growth in expenditure on all the industry related projects in which DTI has an interest is as follows:

	MECU	£m
1987	269	188
1988	376	248
1989	648	467

Total provision for the EC R&D Framework Programme for 1990 is approximately 1,576 MECU of which about 50 per cent (788 MECU or £580m) is of relevance to DTI interests. UK organisations secure just over 20 per cent of the total funding available (compared with the UK contribution of 19 per cent of EC R&D expenditure) and actively participate in between 50 per cent and 80 per cent of the projects dependent on the individual programme area.

16. Under the current (1987-91) Framework Programme (5.4 BECU, £3.8bn) the main industrial programmes are ESPRIT (European Strategic Programme for Research in Information Technology), RACE (Research in Advanced Communications in Europe) and BRITE/EURAM (Basic Research in Industrial Technologies for Europe/European Research in Advanced Materials). The particular areas of manufacturing R&D covered by BRITE/EURAM include: advanced materials technologies; design methodology and assurance for products and processes; applications of manufacturing technologies, particularly for established sectors; and improved manufacturing techniques for more effective production. In addition, the ESPRIT programme includes research in Computer Integrated Manufacturing (CIM) and the application of IT to industrial engineering. Last year in the first round of BRITE/EURAM UK participants were involved in 96 of the 163 selected projects (59 per cent).

17. Agreement was reached at the 15 December Research Council for the new (1990-94) Framework Programme (5.7 BECU, £4.2bn). The UK succeeded in shaping the technical content and balance of the programme along our preferred lines, including the setting of clear objectives for individual activities. The UK Government in particular recognises there is a strong argument that collaborative R&D in Information Technology and Telecommunications should be conducted on a European, rather than a purely national, basis and our domestic programmes reflect this.

18. The Government also continues to emphasise that expenditure should be directed towards well-justified proposals with a clear European dimension and which represent value for money. EC research programmes must be complementary to national activities and should continue to be aimed at collaboration in long-term, pre-competitive research and development. An important theme within the industrial programmes will be research in support of standards.

#### *Technology Transfer*

19. One way to strengthen the UK's industrial innovation performance is to improve the transfer of scientific or inventive capability into commercial application. Much of this transfer should occur through



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market forces, but where the market needs to be reinforced DTI encourages technology transfer. The Department's support is primarily aimed at small and medium sized firms and covers not just new technology but also the transfer into commercial applications of best practice techniques and technology. Current programmes include advanced information technology, open systems standards (for IT equipment), modern engineering materials, advanced sensors, and technology from overseas. Fourteen Regional Technology Centres have also been established in conjunction with DES and the Employment Department: Training Agency to provide technology transfer and training facilities for business. Planned expenditure on technology transfer is £36.5 million over the three years together to 1992-93. DTI is also actively encouraging technology organisations to take part in the EC SPRINT programme (Strategic Programme for Innovation and Technology Transfer) which links such organisations within the EC.

20. *The science base:* The last few years have seen a considerable strengthening of the links between industry, on the one hand, and Higher Education Institutions (HEIs) and Research Councils, on the other. The Alvey programme marked a significant innovation for the DTI; one of its major aims was to increase collaboration between the science base and the Information Technology industrial community. In addition to participating in LINK programmes described earlier, the Research Councils have played their part in improving the transfer of technology from universities to industry with mechanisms such as the CASE awards (Co-operative Awards in Science and Engineering), the Teaching Company Scheme (jointly with DTI—see paragraph 36) and the recently announced Integrated Graduate Development Scheme. The British Technology Group (BTG) achieves technology transfer through licensing technology from HEIs and their public sector organisations, and increasingly, from the private sector.

21. *Technology from overseas:* Whilst a number of high technology firms are very active in seeking out technologies from overseas, a survey of 115 firms recently carried out for the Department indicated that the majority of companies do not approach the acquisition of overseas technological information in a systematic fashion. The survey indicated that very few have formal organisations for seeking overseas technology, most approaching it in an ad hoc fashion with decisions being sanctioned by senior management rather than delegated to operating divisions. Acquisition of information was shown to be an activity very much carried out jointly with other business practices—most commonly sales and marketing. Contacts were made for essentially commercial reasons with information on overseas technology being gained in the process. The most widely used sources of information on foreign technology were other companies, especially customers, suppliers, competitors and parent and subsidiary companies, as well as joint ventures and agency agreements. Many companies also gather information from attending and exhibiting at trade fairs in the UK and abroad—again an activity undertaken for other commercial reasons with inward technology transfer being a by-product.

22. One way UK industrialists can become more aware of areas of technology developed in other countries is through DTI's OSTEMS Scheme (Overseas Science and Technology Expert Mission Scheme) which was set up in September 1986 to increase awareness and improve the flow of information into the UK. Small groups of technical experts from British industry and academia spend a fortnight abroad inspecting industry and relevant centres of expertise; within three months of their return to the UK the mission members convey their findings in a written report and presentations at a one-day seminar. To date there have been 330 participants in OSTEMS involving 70 missions and 72 seminars. The target for 1990-91 is 30 missions.

23. *Defence:* 'The Potential for Civil Benefit from Defence Research and Development' (published jointly by DTI and MOD in October 1989) reported on the extent to which MOD's extramural R&D contractors were able to use knowledge gained under defence contracts for civil purposes. The report identified over 160 product lines—worth £3.2bn per year in sales—which have been derived from defence technologies, including thermal imaging, and traffic control equipment, space technology and satellite TV. The study showed that barriers to spin-off were not primarily technical but rather due to a 'culture gap' between a company's marketing and other activities for defence and civil markets. The companies were most likely to exploit defence technologies in civil markets where they have a unified technology base; manufacturing and test facilities able to cope with defence and civil market awareness; R&D programmes directed at specific markets; and sufficient financial resources. The report also stated that as a result of the commercial approach to defence procurement pursued in recent years companies were seeking to address other customers in the defence market as well as trying to maximise returns on investments by entering civil markets.

24. The DTI continues to work closely with MOD to improve still further the environment for transfer of appropriate defence R&D to the civil sector. The Civil Industrial Access Scheme, launched in 1987, aims to give companies greater access to MOD resources and expertise. As do the programmes which DTI funds at two of the MOD Research Establishments—the Royal Aerospace Establishment (RAE) and the Royal Signals and Radar Establishment (RSRE). In addition, the successful National Electronics Research Initiatives at RSRE, Malvern open up MOD expertise and resources in collaborative ventures with UK industry. DTI and MOD are currently carrying out a pilot study on the effectiveness of a Civil Exploitation Clause written into MOD defence contracts to help stimulate companies to get civil as well as military benefits from MOD procurement.

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25. “*Managing into the 90s*”: This programme, which was launched by the Department in January 1989, is aimed at stimulating the Spread of Best Practice including the effective use of new methods and technology in UK manufacturing. As part of the programme DTI commissioned a report entitled “Manufacturing into the late 90s” which is intended to encourage companies to think strategically about their own operations by considering the “drivers” of manufacturing in the next decade and the sort of response which companies should consider making. The report emphasised the importance of effectively managing the new product development process, of devising the rational factory and of adopting an integrated approach to logistics organisation and information systems. One example of this more integrated approach is the way in which the best companies are already designing new products and engineering the facilities on which they will be made as a single activity.

26. A further example of the way in which relationships are changing is the far closer partnerships which are developing between companies and their suppliers. DTI views the Spread of Best Practice in purchasing and supply as a major contributor to competitiveness in industry and commerce. A module under the “*Managing into the 90s*” programme has been developed to encourage industry to take up the most effective methods. This module comprises a suite of literature outlining the ways in which small and medium sized firms in particular can set about improving their purchasing and supply functions. It also includes a series of “Profit from Purchasing” seminars which are currently touring the country outlining in novel format how firms can take advantage of the benefit of best purchasing practice. Although there is no discrete Consultancy Initiative for purchasing, much of the function can be covered by the existing Consultancy Initiatives.

27. The “*Managing into the 90s*” programme is also concerned with quality, design and manufacturing systems and these topics are highlighted to industry through a series of seminars and workshops, a mobile demonstration unit, and a programme entitled “*Inside UK Enterprise*” under which companies can visit firms who have adopted modern technology and methods in their own operations and are willing to give to others the benefit of their experience in having done so. During 1989 over 13,000 company representatives participated directly in these activities in addition to which audio visual and written material reached a still wider audience.

#### *Small Firms*

28. In recognition of the importance of innovative small firms, single company support is available for innovative, high risk projects through the competitive scheme, Small Firms Merit Award for Research and Technology (SMART), for firms with fewer than 50 employees. Following the success of SMART in 1988 DTI increased the number of awards from 100 to 140; and in 1989 the Department made 150 awards. Expenditure provision for the three years together to 1991-92 is £29m. In 1990 the Department has launched the competition for 150 awards, but would be prepared to consider an increase if the number and quality of applications justified this.

29. As this submission has already mentioned, the Department’s technology transfer initiatives are primarily aimed at small and medium sized firms, and the collaborative research projects supported in Research and Technology Organisations can be particularly tailored to the needs of such firms. Indeed, most of the collaborative research programmes have specific targets for the involvement of small and medium sized firms in the research and/or the dissemination of the results.

#### CONSULTANCY INITIATIVES

30. The Consultancy Initiatives, launched in January 1988, aim to enhance the competitiveness of small and medium sized firms (with fewer than 500 employees) through improved management performance by subsidising the use of external consultants. Support is available towards the cost of specialist consultancy lasting between five and fifteen days. Three of the Consultancies are technology related—Design, Quality and Manufacturing Systems—and accounted for 61 per cent of projects for manufacturing firms (43 per cent for all firms) by 2 February 1990. The other three Consultancies address business practices: Marketing, Business Planning, and Financial and Information Systems. By early February 1990, nearly 31,000 firms had benefited (51 per cent of which were manufacturing firms) of which 13,000 (73 per cent manufacturing firms) took the Design, Quality and Manufacturing Consultancies. The plan for 1990-91 is to support 1,250 consultancies per month for all six Consultancies as a whole.

#### OTHER SUPPORT FOR INDUSTRY

31. Among the Department’s other activities there are three which are most relevant in terms of supporting innovation—directly or indirectly—in manufacturing industry: the Civil Aircraft Research and Demonstration Programme, Support for Standards and Accreditation, and Education and Training.



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*Civil Aircraft Research and Demonstration*

32. A variety of subsidies by overseas Governments cause distortions in international markets for aviation industries. DTI therefore supports a programme (planned at £73.7m over the three years together to 1992-93) to help key sectors of the UK aircraft and aero-engine industry maintain and develop an advanced technological capability and thus compete successfully in world markets. The programme is carried out at the Royal Aerospace Establishment, in industry and universities; it also contributes to the construction of the European Transonic Windtunnel. In addition, the Government has provided launch aid for civil aerospace projects on terms which entitle it to receive levies on the sales of aircraft or engines whose development has been assisted.

*Support for Standards and Accreditation*

33. *Measurement standards:* the DTI spends around £40 million per annum (estimated full economic cost in 1990-91) on the research, development and maintenance of national measurement standards, principally at its own Research Establishments. Government support for this work has been confirmed in the July 1989 White Paper "Measuring up to the Competition" (Cm 728). The White Paper also described how these measurement standards, which lie at the centre of the National Measurement System, provide an essential national infrastructure which supports many activities including trade, innovation and quality in manufacturing industry.

34. *Accreditation:* The performance of innovative products can be effectively and efficiently demonstrated through testing in laboratories who have demonstrated their competence to a recognised independent authority and whose certificates are therefore widely accepted in the market. The Department operates the National Measurement Accreditation Service (NAMAS) to accredit calibration and testing laboratories which satisfy internationally agreed criteria. Through mutual recognition agreement with other national schemes, NAMAS certificates are increasingly being accepted in overseas markets. Currently, just under 1,000 laboratories, the vast majority in the private sector, have been accredited by NAMAS and most offer services to manufacturing industry.

35. *Specification standards:* Many specification standards require effective test methods. This has become even more important given the role of standards in completing the Single European Market. The Department therefore supports projects in Research and Technology Organisations to develop test methods and data for standards. DTI also continues to support work on national, European and international standards in order to increase the efficiency and international competitiveness of British industry. This mainly takes the form of a grant in aid to the British Standards Institution, whose first priority is now the standards work required to complete the Single European Market.

*Education and Training*

36. DTI currently complements the education and training activities of other Departments, particularly DES and the Employment Department: Training Agency, using pump-priming finance when appropriate. Expenditure on education and training in 1990-91 is planned at £30m. This includes the Teaching Company Scheme (jointly sponsored by DTI, SERC, ESRC and the Department of Education in Northern Ireland) under which young graduates undertake key projects in companies under the joint supervision of academic and company staff thereby improving industrial performance through successful technology transfer. Current plans are to increase the number of programmes under the Teaching Company Scheme to 500 a year by 1992-93, with DTI expenditure in the three years together to 1992-93 of £23m. The Department also currently provides a grant in aid to the Management Charter Initiative which is seeking to increase the standards of management throughout business.

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[Continued

**Examination of Witnesses**

DR R COLEMAN, Chief Engineer and Scientist, and MR B MURRAY, Head of Research and Technology Policy Division, Department of Trade and Industry, called in and examined.

*Chairman*

215. Thank you very much for coming to help us, and for your memorandum. I would like to start off with a question in the hope that we can clarify the basis of our discussion this afternoon, and if you then wish to make comments on your paper, please do so. Does the DTI agree with the proposition that increased innovation in products and processes is an essential contributory factor in making industry more competitive and more profitable, with the overriding objective of increasing its output and share of world markets so as to reduce our huge deficit on the balance of trade in manufactured products?

(*Dr Coleman*) I would certainly go along with the first part. I think innovation can also have a part to play in the second part, but it is not the only way of reducing the balance of payments deficit.

216. I said "an important contributory factor"?

(*Dr Coleman*) Yes. We would agree with the proposition.

*Lord Gregson*

217. Dr Coleman did say it was not the only way of improving our balance of payments. Would he care to comment on the others?

(*Dr Coleman*) As the Chancellor of the Exchequer said yesterday, part of the problem with the balance of payments is consumer demand. Obviously, one way of reducing the balance of payments deficit is to reduce consumer demand.

218. Is it as simple as that? If you reduce consumer demand to zero you can do away with the balance of payments altogether, in which case we will have a miserable standard of living in the United Kingdom?

(*Dr Coleman*) Yes, but in his case he was talking perhaps about the use of too much credit encouraging consumer demand which causes problems later on when you have to pay the bills.

*Chairman*

219. I think we would all agree that it is government policy to expand the economy in due time?

(*Dr Coleman*) Yes.

220. If we do not increase the output of manufacturing industry, when we come to expand the economy again the balance of payments deficit will shoot up because manufacturing industry will not be able to meet the needs of this country, so it is highly desirable that we increase the output of manufacturing industry?

(*Dr Coleman*) Yes; we want to try to keep these two things in phase.

Lord Gregson] It would make a pleasant change if you could!

*Chairman*

221. Would you like to amplify your memorandum in any way?

(*Dr Coleman*) Perhaps I may take just a few minutes to make a few key points. The very first point I was going to make is that we see innovation as essential to wealth creation and essential in enabling companies to remain competitive in world markets. That is perhaps another way of putting at least part of your introductory comment. We also believe it is essential for companies to take the lead in innovation. There is a role for government in specific areas, but in the main it is for companies to take the lead. The DTI innovation policy was announced in January 1988 in the White Paper "*DTI—the department for Enterprise*", and that is still the policy of the DTI; there has been no major change since then. The central theme of the DTI policies is that the most sensible economic decisions can be taken by those people competing in the market place, and this is as true for innovation as any other business activity. The principal role for government with respect to innovation is in trying to get the climate right, and by "climate" I mean a range of government policies, not all directly the responsibility of DTI, but concerned with such things as monetary and fiscal policies, the reform of industrial relations, deregulation, open markets, privatisation, a balanced regulatory regime for the benefit of workers and consumers, preserving and improving the science base and making sure there are adequate supplies of trained manpower for industry. I would say the one view which we receive from industry more than any other is that if we can get the climate right it is much more important than direct financial support for individual products or processes. The objectives of our policy are to encourage industry to increase its own funding in R&D, to assist in technology transfer, to encourage best practices in business, to encourage industry to make the most effective use of its own and academic resources through collaborative research, both national and international, and, through specific support measures, to encourage innovation in small firms, particularly in advanced technologies and in the regions. We mention a range of collaborative programmes in our memorandum—four in all—but in view of the fact you do not want me to talk for very long I will assume you have read about them. All in all, in the next three years we expect to spend over £300m in support of collaborative research. There is one additional point I would like to make about collaborative research. We should not forget the contribution that the European Commission is now making to R&D programmes. In the UK, and in the DTI in particular, we have been very active in the last few months in helping to frame the third Framework Programme so it is in the best possible form to assist in improving the competitiveness of



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European industry. May I remind the Sub-Committee that in 1990 UK manufacturing companies should secure from the EC approximately the same amount of funds for collaborative R&D that they receive from the DTI, and the trend is increasing, so you can see that the Commission is playing an increasing role in collaborative pre-competitive research for the benefit of European industry.

I would also like to mention the role we play in linking with the science base, particularly with the SERC, in several areas—IT, advanced manufacturing technology and biotechnology. Joint committees try to see that our funding, both for the academic sector and industrial sector, is complementary. The last thing I would like to say before closing my introductory remarks is that we have a lot of advice on innovation, and we welcome this; we take it all seriously. However, in the last 18 months we have set up an Innovation Advisory Board to advise the DTI. That Board is chaired by Lord Chilver, and the members are specifically chosen as people who would be recognised either as innovators themselves or at least as chief executives of innovative companies. The Board has met several times, and I think the first message they want to get across is very much like the one the Chairman began with, that, to use their words, innovation is the key to profitable and sustainable growth. They have also developed a framework in which they are conducting their business, and that looks mainly at interfaces: the interface between companies and the City, the interface between companies and the Government, the interface between companies and higher education, and so on. They want to look at the inhibitors and the ways in which one can help drive innovation by improving transfer across those interfaces. The first one they have studied is the interface with the City, and they have got some useful recommendations to make for the benefit of both companies and investors. We are proposing to publish reports and have a conference in June on two aspects: innovation and growth, and an investigation into the company/City interface. That is all I wish to say by way of introduction, and I hope that is helpful to the Sub-Committee.

222. I note that in paragraph 12 of your memorandum you say that, although it is primarily industry's job to identify profitable areas of innovation, "the Government recognises that reliance on the decisions of firms may produce inadequate innovation for the maximum benefit of the economy." I think we are all glad to see that acceptance, and perhaps you can help us by indicating how you see the Government helping innovation other than by the ways you mention—through collaborative research and the like. Are there any other ways in which you see that policy being implemented?

(Dr Coleman) That particular phrase is meant to indicate that often there is not a single beneficiary of research and development undertaken by a

company; there are often externalities and benefits to other companies. We feel that we should help companies in those particular areas so they would be willing to do things for which they are not the sole beneficiary. There are other ways in which we believe the strategic research undertaken in universities and polytechnics can help innovation.

Lord Kearton

223. In paragraph 7 you say: "The agreement by the accountancy bodies that accounts of public companies and large private companies should disclose expenditure on R&D, starting with the 1989 accounts, will help bankers and shareholders assess the value and advantages of R&D investment more readily." Why did you pick out bankers? I can understand why you would want to pick out fund managers, but the record of bankers over recent years has been one of tremendous losses through overseas loans and other things.

(Dr Coleman) I do not think you should read too much into that word.

Chairman

224. Should it be "financiers"?

(Dr Coleman) I think it is the people who provide the money; that is what we mean.

Lord Gregson

225. I would like to try to understand the basis of the figures. You say that industrial spending on R&D has increased consistently in the past four years, and you quote figures. I presume those figures are based on a questionnaire approach. There are those who in the past have been very unhappy about verification of the figures. I presume that is the basis on which they have been done?

(Dr Coleman) Yes.

226. By the end of this year, you will be able to verify them by looking at the company accounts to see whether or not the auditors agree with the questionnaire?

(Mr Murray) I do not think there will be compatibility with the audited accounts of the company, because the company accounts will show the total R&D of the company, not necessarily that which is undertaken in the UK. We already know there is some significant incompatibility between the R&D reported in major company accounts and that returned to us in the survey.

227. This was what worried us two years ago. When we looked into it we came to understand that companies were a bit *laissez faire* in the amount they quoted to the DTI on R&D, and I suspect we have the same problem now.

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(Mr Murray) I think there are two points. One is concerned with the question of the definition of R&D and its auditability; the second point is where it is carried out.

Lord Gregson] We have spent a lot of time recently looking at the definition of R&D and have an assurance that Frascati rules supreme as far as the UK is concerned, and SSAP13 is based on Frascati, so there should not be much difference.

Lord Chorley] To take ICI as an example, it is included in the annual report and the DTI do not pick it up.

Lord Gregson] I understand that, but that is the problem.

Chairman

228. SSAP13 requires companies to declare their whole R&D, not their UK R&D?

(Mr Murray) Yes.

Chairman] It will not distinguish between what is done in Germany and what is done here.

Lord Gregson] Most major companies have consolidated accounts, but there are plenty of others which do not.

Lord Whaddon

229. In paragraph 4 you say that "manufacturing productivity in the UK grew in the 1980s faster than in all other major industrialised countries", but I have the impression that there has been a distinct falling off in the past couple of years. Is that true, or not?

(Dr Coleman) I do not think so.

(Mr Murray) In the last year, I think you are right.

230. It is true there has been a distinct tailing off in the last year, so it is not true to say it occurred right through the eighties?

(Dr Coleman) We had eight successive years at an average of over 5%, and in the eighties it has been greater than in any other country in Europe.

231. Another criticism I have heard of this series of statistics is that it is alleged the increase in productivity in the early and mid-eighties was due more to the shedding of excess labour than to improvements in technology. Do you agree with that?

(Dr Coleman) There is no doubt that a significant factor in the improvement in productivity was the use of fewer people, but one needs capital expenditure in order to do that.

232. In this case, the criticisms I have heard are to the contrary; there has been an elimination of trade union restrictive practices, not an improvement in technology, so we have not been improving technology as compared with our competitors?

(Dr Coleman) Both things play a part in this; I am not able to tell you the proportion of each.

Chairman

233. I am sure we all agree that the increase in productivity is encouraging, but the fact is that we started from a very low base, and our competitors, like France, Germany and Italy, also increased their productivity pretty fast. What matters is whether we are increasing our productivity fast enough relative to our competitors. Do you think we are?

(Dr Coleman) During the eighties we have been; we have been doing better than our competitors in the European Community.

Lord Kearton

234. In the sixties productivity was very similar over 10 years to the eighties; productivity improved. What happened was that over the late sixties and seventies our competitors raced ahead of what were not too bad achievements on our part. To a certain extent, we have regained in the eighties where we were in the sixties, but our competitors have taken off again. All the figures indicate that we are turning down again. If I may say so, I thought this was an excellent paper, and we must congratulate the authors of it. However, it brings out the basic dilemma, that here we have the standard Government line about how splendidly we are doing, and yet what is worrying is that we are faced with a deficit on manufactured goods of £25bn, or whatever it is, a forecast for the nineties that this will not be cured in a hurry, and yet the whole tone of the paper is that we are doing very well. We are doing much more than we used to do, but the basic question is: Are we doing anything like enough?

(Dr Coleman) I have to go back to my original statement, that it is for industry to do it rather than the Government. The Government can do a certain amount. The Government is concerned with creating the right climate, but it is not in the business of choosing those areas in which to put additional investment or R&D expenditure.

235. If I may say so, some of these paragraphs are somewhat contradictory. You make the classic case that market mechanisms should rule supreme, and later you say this is not always enough. In fact, this comes out very clearly in paragraph 12, as the Chairman has already pointed out. Perhaps the support by government is still not vigorous enough?

(Dr Coleman) I find it difficult to know precisely what question you are posing.

236. In paragraph 12 you point out: "firms themselves are best able to assess their own markets and to balance the commercial risks and rewards of financing innovation . . ." You go on to say: "However, the Government recognises that reliance on the decisions of firms may produce inadequate innovation for the maximum benefit of the economy." In other words, you say at one point that what is important is the market mechanism, but you go on to say that the market mechanism may not be



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enough, which I am very glad to hear you say. The question I pose is: Are you making up the deficit vigorously enough?

(*Dr Coleman*) All I can say is that we recognise there are areas to be encouraged: for example, standardisation and the National Measurement System. That is another area we support which is for the benefit of industry. As far as we can tell, we believe we are doing as much as we can.

(*Mr Murray*) I think the nature of the schemes we are now operating addresses some of the problems to which Lord Kearton referred. The collaboration on research between companies and universities is an attempt to overcome something which we feel is a weakness in some industries in the UK, so that is addressing the problem where company decisions have not led to enough collaboration. European collaborative programmes and EUREKA are addressed at achieving more international linkages in science and technology. Again, this is an area where companies are doing quite a lot but more needs to be done. If you look at the actions we are taking—going down to operations like teaching-company schemes where academics work in industry to solve particular problems—we are helping to do things which we judge have not been pursued enough on the basis of company decisions about market forces.

*Lord Butterworth*

237. The preliminary question is whether you think the Government is doing enough. If I may quote to you a sentence from a document we have received from NEDC you may care to comment on it: "Central government's financial commitment towards the establishment of technology transfer and diffusion mechanisms appears to be greater in West Germany, Japan and France than in the United Kingdom." Are we doing enough?

(*Dr Coleman*) I find it difficult to compare ourselves with Japan because I do not believe Japan spends very much money on trying to transfer technology from the universities, for example. We do considerably more than they do in those areas. Japanese industry regards the universities as a source of manpower; it does not regard them as a source of technology.

238. It ties up with the quotation from your paper Lord Kearton has just given you: "However, the Government recognises that reliance on the decisions of firms may produce inadequate innovation for the maximum benefit of the economy." If you put that sentence together with what NEDC have said I think you would agree with what NEDC are saying, that it would be better if government did more.

(*Dr Coleman*) Of course we could do more. It depends to some extent on what you are trying to transfer. How much is there in the academic sector and how much can industry use? In the case of the LINK programme which is trying to encourage

collaboration between companies and higher education establishments, we have not been limited by money but by the willingness of the two parties to come together.

239. Dr Coleman, as you know, I have great admiration for a lot of the work which has been going on in technology transfer, and a lot of it has been stimulated by the DTI. This was referred to by your colleague a moment or two ago. Would you tell us how you set about technology transfer by getting collaboration between universities, industry and research institutes?

(*Dr Coleman*) This occurs at various levels in trying to make sure that we make the best use of the exploitable science.

240. Can you give a concrete example? Take the field of biotechnology. When you actually get to the detail you see a new method of tackling the problem.

(*Dr Coleman*) Let me give you my favourite example because it is one I helped set up; it is called the gene tool kit club. There was no doubt that in research councils and universities there was an ability to manipulate genes in plants. It is quite easy to do it in petunias and tobacco but much more difficult to do it in cereals, which are the really important crops. We persuaded 11 companies to come together and fund a programme of £3m. They gave half and the DTI gave half. Four particular groups, two universities and two research institutes, came together to do the work those companies wanted. At the end of that three-year programme I would not say we had exactly what the companies wanted to make it easier for them to manipulate genes, but they were a lot further down that track and benefited very substantially from it. All 11 companies now have an advantage that they did not have before. This club mechanism is one way in which we improve the understanding of the science and develop the technology which companies are able to use.

241. Would I be right in thinking that the revolutionary element in this kind of approach is that instead of waiting for the scientists to produce something new which can then be applied in industry, in the new system you go out to industry to find out what their problems are and talk to the scientists and find those who are prepared to help solve industrial problems?

(*Dr Coleman*) I would not say it is quite like that. We brought the people together. Because industrialists were saying, "This is what we are short of and where we need to see advances in strategic science", the academics could say, "We can see how we can help you", and there was a mutual definition of the programme. I think there was an industrial element, in that it was wanted within a certain

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timescale and a project manager was appointed to manage it so it went along at the appropriate pace, rather than being left to fit in with PhDs.

242. I think it is a very successful way of tackling the problem. We come back to the statement: Is there enough of it? Ought we to expand this method of tackling technology transfer?

(*Dr Coleman*) The LINK programme is exactly a programme of that kind. It has taken longer than we thought to get it going. We now have 21 programmes and about 55 projects. Initially, it was thought we would be able to do it quicker than that. This not due to lack of effort on our part; it is in persuading companies there is something worthwhile for them if they use this particular mechanism.

*Lord Chorley*

243. Where is the inhibition? Is the inhibition on the industry side or the university side? Is it a question of how you market it? You say in your paper that £294m has been set aside but you have only managed to spend £28.9m, which really illustrates what you say; it does not seem to be taking off.

(*Dr Coleman*) Initial thought was that the companies wanted more support. They previously received more support from government because they were used to getting the academic contribution for nothing and when they were getting only 50% of the total programme cost they held back thinking they would get more.

244. When did LINK start?

(*Mr Murray*) February 1988.

(*Dr Coleman*) They have now realised that the terms will not get any better, and in many areas they are becoming quite active. The particular areas which have been well supported are those concerned with instrumentation where many companies can see benefits. In the area of semi-conductors, for example, it would be more difficult to get programmes going.

Lord Gregson] The Budget Statement yesterday pointed out that there would be virtually no growth in the next financial year; growth here is the lowest in the western world, and yet at the same time we are sucking in £15bn worth of manufactured goods. If you do not squeeze out the demand with zero growth, God help us in the next 10 years. The spend on LINK at the moment is £28.9m. One would accept that the schemes have to be set up in the right way and proceed in the right way, but it is minuscule compared with our problem.

Lord Chorley] The problem is that the DTI cannot get the money spent.

*Lord Gregson*

245. I do not mind what the problem is from that point of view. I am merely pointing out that what we are doing is throwing snowballs to put hell

out. How you can expect to reverse a balance of payments deficit of £15bn this year with these tiny approaches to the problem I just do not know.

(*Mr Murray*) The answer is that they are not intended to do that. It clearly is not the task of the DTI's spend on science and technology to deal with the major economic problems of the deficit on the balance of payments on manufactured goods. It is something which is aimed at contributing to that, but nothing we can do by definition in expenditure in the current financial year on R&D could possibly attack that problem; it has to be attacked by macro-economic management.

246. What about supporting near-market developments of products? Would that not make a big hole in it? We have done it in the past.

(*Dr Coleman*) First of all, the timescale for the benefits arising from the LINK programme is of the order of five to 10 years. When you ask about the benefit of using our resources for near-market activities, if they were at anything like the level that we have been supporting in the past, again it would have very little impact on the balance of payments. Most of the R&D expenditure in this country is by about 20 companies, and those companies do not——

Lord Gregson] I did not suggest we should have funding at the level it is or it was. I am suggesting that government funding ought to be increased drastically in order to produce the turn-round which is absolutely essential.

Lord Chorley] You are asking about the amount of government spending, but the problem appears to be the ability to spend the money fast enough.

Lord Gregson] LINK is a longer-term programme.

*Lord Chorley*

247. I would like to pursue the LINK programme. Dr Coleman started off by identifying some of the reasons for the problems in takeup. For example, he said that industry had held out for a bigger contribution. What is your mechanism for marketing? Do you go out to potential customers? I would be interested to hear how you go about it and how you might improve the rate of takeup?

(*Mr Murray*) We do it by a variety of means. This is run jointly with the research councils, principally the SERC. Some of the work comes out of discussions which SERC and ourselves have held with industry and complements longer-term strategic research by SERC, so in some sense there is a natural progression. In other areas we hold conferences to identify what should be done, or in the case of opto-electronics there has been a mission to Japan. There has been a discussion about what should follow an earlier programme which we have called JOERS. We have a variety of means of putting programmes together, and at that level we have been successful. We have put together 21 programmes, and the total Government and



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industry spend will approach £300m. We do not have a problem in identifying suitable areas for collaboration in LINK. Where we have been slow is in committing individual projects, and that has required a great deal of negotiation and some rather more elaborate arrangements for organising the collaboration in each case than occurred under the earlier spending regime. We and companies—I emphasise that—are still learning how best to organise and get agreed further LINK projects. We now have 55 in operation; another 55 have been agreed technically, but we are still not satisfied with the rate of progress.

*Chairman*

248. Turning to the previous point put by Lord Gregson and your point that the Government's task is to create the right climate for innovation, you mentioned just now that the main weapon was macro-economic policy. The only thing economic policy can do is reduce the demand for goods in this country. That releases capacity in manufacturing industry to meet other requirements, such as exports. Why is it British industry is finding it so difficult to transfer capacity from meeting home demand, which is now reducing, to exports?

(*Dr Coleman*) I think exports have improved very significantly over the last few years, so that is happening.

249. It ought to be happening much faster now that home demand is being reduced and there is more capacity in British industry to increase exports?

(*Dr Coleman*) This is hopefully something which will come through this year or next year.

250. Do you think it will?

(*Mr Murray*) I think the most recent CBI survey indicated that firms were reporting buoyant export demand, which is a good sign. Whether that is of the scale we are talking about we cannot say, but the indications from industry are quite promising.

*Lord Kearton*

251. I think manufacturing exports last year were about 55% of manufacturing production. The Chancellor yesterday said that in the last 12 months the enormous amount of imports had increased by 11.5%; in other words, we are now exporting about 40% of our total manufacturing production. Is this anything like enough in view of the enormous deficit we are running? The CBI surveys all indicate that manufacturing investment will fall quite sharply in the next 12-18 months.

(*Dr Coleman*) We have to repeat: it is no good saying this to the DTI, you should be saying it to industry.

Lord Kearton] That is fair, but the question is whether you are chivvyng or bullying industry enough in the sense of Lord Chorley's point.

*Chairman*

252. Would you not agree that the problem of industry is one of meeting demand? The demand is there; look at the imports which have been taking place in recent years. There is plenty of demand, but industry is finding it difficult to meet it for some reason?

(*Dr Coleman*) I think this takes us on to the kind of thing we are trying to do with the Innovation Advisory Board. It is their view, which we accept, that there is a need for chief executives to do more and to accept that innovation is more important than they do at the moment. For example, the survey done by Deloittes not so long ago said it was not lack of money; it was a lack of will and leadership.

253. You believe the ethos of the top management of many British companies is inadequate; the need to increase output through innovation and other means is not sufficiently appreciated?

(*Dr Coleman*) If you are generalising, yes, we want more chief executives to take the message that innovation is a prime factor to which they need to give more attention.

254. In order to increase output and share of market?

(*Dr Coleman*) Yes; in a sense, it is the key to sustainable, profitable growth.

*Lord Gregson*

255. Lord Kearton touched on the question of investment. I think one of the most important factors in the present state of manufacturing industry, considering how far we are behind compared with the Japanese in automation and productivity, is the need for investment, whether in plant or product development. I must say I am considerably concerned about the continuous quoting of across-the-board figures. At least two major academic exercises which have been carried out indicate that the increase in investment has been in the services and parasitic activity and not in productive equipment. I cannot fault the recent Oxford study; I think it is right. Does it not show that the situation is not really as rosy as some people think? Can I say that the one area where investment has increased in the manufacturing area is the purchase of company cars, because by virtue of the accounting rules that we use they are capitalised and they appear amongst investments. That is the only area where Oxford can find an increase in investment in productive industry in the UK?

(*Mr Murray*) Was this an exercise by Glyn of Oxford University?

256. I cannot think of the name.

(*Mr Murray*) I think that is right. I believe that the comparison was with Japan.

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257. He took all of the investment in the UK and showed where it had been channelled, and he found it was channelled into the service sector and parasitic activity, and the investment in productive industry was in fact zero?

(Dr Coleman) I do not accept it is zero.

258. Except for company cars.

(Dr Coleman) Last year, investment increased by 5% in manufacturing industry.

259. Including company cars?

(Dr Coleman) I do not have that analysis<sup>1</sup>.

Chairman

260. A recent report by CEST said that "many industries in other countries enjoy better government support for science and technology." We have covered this to some extent, but would you accept that as a statement of fact?

(Mr Murray) We found this a slightly curious quotation because it comes from a CEST report on what some industrialists say. There is no analysis behind it supporting the statement. We felt that the answer in a sense was, yes, it is bound to be true, but it is difficult to find statistics to support it. There are different industries in different countries, and government expenditure tends to be in support of industries where a country is strong, so you will get a mismatch of comparisons. I think it is a question which is either aimed at the overall support of technology or seeks to identify those sectors where we feel in the UK our industries are being disadvantaged.

261. You have spoken a great deal about the responsibility of industry for innovation. It is a fact that the proportion of the total civil R&D done by industry is increasing compared with what government puts in. Is that an intentional policy which will be continued, that the proportion of government funding of civil R&D will be reduced?

(Mr Murray) We certainly would aim as part of the overall development of the UK economy for industry to continue to fund an increasing proportion of its own R&D.

262. You are not concerned about that?

(Mr Murray) No; we would be concerned if they were not. To go back to a much earlier point about where the future products and future improvements

in productivity are coming, we cannot do again what we did in the early 1980s, when we shut down a lot of inefficient plants and made a lot of workers redundant; we do not have the fat to get rid of that we had then. We now have to rely much more on investment in technology in order to compete in the 1990s, and part of that is greater funding by industry of R&D.

263. But in view of the size of the problem, do you think it would be more sensible for government to increase or at least maintain its contribution to civil R&D?

(Dr Coleman) There has been a great deal of expenditure transferred to support the science base. If we go back to just over a year ago, there was a switch, roughly £100m was taken from the Department of Energy, DTI and the Ministry of Agriculture and £300m was given to the DES to increase the funding in basic science. I would suggest that the majority of industry believes it is better to put public money into the science base than to use it for product and process development paid for by the DTI. One other thing I would like to say about the figures is that it is often forgotten that in the DTI R&D expenditure there is a significant element of launch aid. It happens that in recent years we have paid out quite a lot of launch aid and now we are starting to get receipts, so it looks as if we are paying out less in net terms, but that is because money is coming back from successful ventures with the aerospace industry.

Lord Gregson

264. Does it not give you an indication of what could be done? One of our great successes is aerospace; it is one of our few industries which has a positive balance of payments, and it has been considerably helped by government money either on a risk loan basis, like launch aid, or R&D investment either directly or through the MoD. That has shown how successful you can be if you have partnership with industry. Do we not need another 10 or so activities like that in order to try to begin turning the tide?

(Dr Coleman) I only wish I could agree with you. It is currently successful, and it is the first time in 20 years that we expect to receive more than we have paid out.

265. That is not my point. If you received nothing back it would still be an outstanding success by continental, American or Japanese standards. They have spent some \$49bn on launch aid and I do not think they have had any of it back, so I do not think that getting anything back is the point I am making; that is incidental.

(Dr Coleman) The reason why we get receipts is because the companies are making profits out of that activity; if they do not make any profits, that is no benefit to them and it does not benefit the UK.

<sup>1</sup> CSO Business Bulletin (2290, published 23 March 1990) shows that manufacturing industries' investment in vehicles—including ships and aircraft—represented 7.3% of total manufacturing industries' investment in 1989 compared with 8.0% in 1985. These figures include leased assets. Total manufacturing investment grew by 16% in real terms between 1985 and 1989 (by 20% excluding leased assets).



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Lord Chapple] Dr Coleman is missing the point. What Lord Gregson is saying is that having had this amount of success, why have we not redoubled our efforts and put more money in?

Chairman

266. I would add to that: Why not replicate it elsewhere? The balance of payments in aerospace products is plus £2bn, and if we had a few more industries like that we would soon be out of the wood.

(Mr Murray) The balance of payments in the chemical industry is £2bn, and they do not rely on government funding.

Lord Gregson] And it is reducing all the time.

Chairman

267. You accept the aerospace figures. Do you agree there is cause and effect there, that the good R&D partnership between government and industry has been very successful in producing a positive balance of payments?

(Dr Coleman) There is a special reason for government putting large sums of money into aerospace, and that is the strategic defence interest.

268. Nevertheless, 50% of their output is now civil?

(Dr Coleman) Yes.

Lord Gregson

269. The launch aid is not on the defence side?  
(Dr Coleman) That is true.

Chairman

270. If we look at the chemicals industry, that also has a positive balance of payments figure of about £2bn. That figure is coming down, but that also receives a certain amount of support from government through purchases mainly for the Health Service; and there is a certain amount of R&D.

(Dr Coleman) There is a purchasing arrangement for pharmaceuticals which includes R&D, but the chemical industry is much, much bigger than that.

Lord Gregson

271. But do not the figures you are quoting include the pharmaceutical sector of the chemical industry?

(Dr Coleman) Yes.

272. Is the chemical industry not one of the major positive balances of payments?

(Dr Coleman) Yes.

Lord Gregson] It is R&D supported through the support by purchases of ethical drugs for use by the

Health Service. Does it not come back to the same thing, that throughout the world government support for these industries is not the exception but the norm, and it works?

Lord Chapple

273. Dr Coleman's statement in respect of the chemical industry actually highlights the problem you have when you read the paper, that is to say, it is full of good intentions but when it comes to the practice they say, "Well, there are some people who survive without government help", and whatever they are going to do they are really going to do grudgingly. As Lord Gregson said earlier on, the £294m is trivial in many ways, and of that £294m which is allocated they have managed to deploy only £29m. When the question is put to the DTI spokesmen as to why that is they say the difficulty arises from the problem of getting collaboration with industry and the universities. I do not believe it for a minute.

(Dr Coleman) I think you have to realise that we try to put the money where it will have an effect. One of the reasons for not continuing with single company support as in the past is that a significant proportion was going to large companies who automatically said, when they thought of an R&D programme, "We had better go and see how much we can get out of the DTI first of all", and did not actually add to the amount of R&D done in the country.

Chairman

274. How successful have small firms been in obtaining innovation assistance under the post-1988 collaborative arrangements? Have you evaluated the effectiveness of the DTI support for those programmes?

(Mr Murray) The analyses we have done show that about 30% of the companies offered collaborative support since we announced our new policies in early 1988 have been small and medium size companies. We have supported some 500 companies of which 160 were small and medium sized companies, but those figures do not include the support we give to the research and technology organisations which have approaching 20,000 small and medium sized companies in their membership. We continue to support research programmes at the research and technology organisations (RTOs). We pay particular attention in our major collaborative programmes to involving SMEs, and we are not entirely satisfied with the extent to which they are participating. But it has to be remembered there are special programmes through the RTOs which are more suitable to the small and medium size companies. You asked whether we have evaluated our post-1988 collaborative support yet, and the answer is that we have not evaluated these programmes. We have evaluated some of our earlier support for clubs and RTOs, and found this effective.

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[Continued]

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275. I think everybody agrees that small companies are badly affected by the current high cost of finance and it is affecting their investment programmes. Is it the intention of the DTI to seek ways of alleviating that problem, or do you just say it is a nasty effect of high interest rates which are necessary to curb inflation and there is nothing which can be done about it?

(Dr Coleman) We have tried to help very small companies through the SMART scheme. This is a scheme applying to companies having less than 50 employees. We run the competition annually, and there are about 150 awards each year. This is a relatively near market activity in which small companies put forward their proposals, they are evaluated quickly and are accepted or not. They can get up to £37,500 in year one, and roughly half of them get £50,000 in the second year. The amount of money we give here is not the key factor. We realised that companies were having difficulty in getting relatively small sums of money when starting up. Once they have got over that hump, it is easier for them to get £1m or something of that kind if it looks as though it is a good proposition. The value of the SMART scheme is to help companies in these initial stages, and it has also helped venture capitalists and other providers of funds to concentrate their efforts on a smaller number of people seeking support. We have got many examples of companies who have had help from us and who then get £1m or £2m from the private sector. I think that is very helpful, and it is another scheme which will be evaluated this year.

276. Are you saying that the high interest rates are not having any significant effect on the investment plans of small companies?

(Dr Coleman) High interest rates must have an effect, but many small companies have become very wary of using banks at all because of the variation in interest rates. I visited half a dozen companies a few days ago and three said they never go to banks; they finance it all out of their profits.

Lord Gregson

277. It must limit their rate of growth drastically?

(Dr Coleman) Yes, it does limit their rate of growth, but it does ensure they remain profitable.

278. I can understand that, but if you limit your rate of growth it means in effect you will never make an inroad into our negative balance of payments of £15bn?

(Dr Coleman) There is some element coming from the small and medium sized companies, but there is also a much larger amount of activity coming from the large companies, and they are not limited in the same way.

279. I would not necessarily agree with that, Dr Coleman.

(Dr Coleman) Many of them have large cash balances.

Chairman

280. In your view, why do they not use more of those cash balances for investment in innovation and new products and therefore increase output?

(Dr Coleman) I think that they feel the investment is unlikely to give them a sufficient yield to make it worth their while. I do not know why they come to that view; perhaps we should ask the companies. I asked one company only a few days ago, and their research director said he had no trouble whatsoever getting money for R&D from his board because he had been able to demonstrate to them in the past that it has given them new businesses and very successful yields, but that is not the generality.

Lord Gregson

281. Last year, the Japanese spent \$29bn in making soft loans to small companies in order to insulate them from their enormously high interest rates of 5%. Does that not give us some indication of the problem we are facing?

(Dr Coleman) Yes. I think our Ministers would say that they do not have the money to support activities of that kind.

282. We quietly go bankrupt instead?

(Mr Murray) No. It is rather difficult to compare our situation with Japan, because Japan has the reverse problem from the problem in the UK; the Japanese do not spend enough of the money they earn.

Lord Chapple

283. And reduce consumer demand?

(Mr Murray) One of the ways of addressing it is to encourage the Japanese to buy more, not just Japanese goods but UK and other goods, but I feel this is rather beyond my personal remit within the DTI.

Lord Kearton

284. I think the Department is to be complimented on SMART; it is a very good idea, but it is on a small scale; it is only £10m a year, and we are talking about 150 firms being involved in it this year. Last year, about 20,000 or 30,000 small firms were eligible for this scheme, so it is a very small amount. Are the hurdles in getting the awards difficult ones? What is the lapse of time between a small firm approaching you with a general idea and getting the grant?

(Dr Coleman) Let me give you the figures for last year. There were approximately 900 applications and 150 awards. Of those 900 applications, we considered it worthwhile awarding 150. It was not a case of our saying at the beginning that, come what



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may, it would be 150; if there had been another 50 really worthwhile ones we would have increased the limit. The timescale is relatively short; it is something like six months.

285. But if you have a failure rate such that out of 900 applications you have 150 grants, what is wrong with the other 750? Are they silly ideas, impractical or what?

(*Dr Coleman*) We did not believe they would be successful in the market place.

286. The implication, presumably, is that the more enterprising of the 30,000 small firms applied and the general standard in small firms leaves a lot to be desired?

(*Dr Coleman*) Do not forget that a large majority of small firms do not do any research at all; only about 25% do some development.

287. We come back to one of your earlier remarks that most of the research done by industry in this country is done by about 20 firms?

(*Dr Coleman*) Yes.

288. It is recognised that our best firms are amongst the world's best, so we come back to the point that we have not got enough of these large successful and internationally competitive firms. What are you doing as a department to get a much higher figure than 20? You would say it is not the Department's job?

(*Dr Coleman*) I do not think there is much that we can do.

*Chairman*

289. When you talk about these 20 firms who do research, do you mean development or research?

(*Dr Coleman*) What the companies report as R&D.

290. The whole thing?

(*Dr Coleman*) Yes.

Lord Gregson] Is Dr Coleman suggesting that we are short of ideas rather than money?

*Chairman*

291. Short of good ideas?

(*Dr Coleman*) I did not say that.

*Lord Gregson*

292. I will say it. My information from the City is that there is plenty of money and no progress. The so-called deal flow has dried up. A lot more money is being put into buy-outs which are completely neutral; there is no new technology flowing from

buying out old technology. The view of the City is that the deal flow is slowing down drastically; there are not the ideas coming forward. Is that your experience? Most of your schemes have been under-subscribed to some extent.

(*Dr Coleman*) I do not think that would be a true analysis. If you look first at the larger firms, they would say something like one-quarter of their R&D is actually used within the company for major business developments. There are plenty of ideas around.

*Chairman*

293. But you are saying that the shortage of finance is not a problem in supporting the SMART programme or collaborative research; the problem is a shortage of ideas?

(*Dr Coleman*) No.

*Lord Gregson*

294. It is the other way round?

(*Dr Coleman*) In the case of the companies which responded to our application, we felt there were only 150 out of the 900 which had ideas which were worth backing with taxpayers' money.

*Chairman*

295. You could have financed prizes for 500 if they had been good?

(*Mr Murray*) We did not actually budget for more than 150, but we were prepared to go back to our Ministers and the Treasury to find that money if more were worth supporting.

*Lord Gregson*

296. You were short of ideas?

(*Mr Murray*) No, and that is exactly the point I wish to answer. I would argue that the response we got from SMART was quite encouraging. Lord Kearton referred to 30,000 small companies, but the target of SMART is companies employing up to 50, and that is a smaller number. My impression, looking through the 150 winners last year and the 140 the year before, is that it is encouraging to find the ideas coming forward. Many of these companies have already been established and have been very ingenious both in finding a market niche and in financing their ideas earlier on. The number can be made to sound small, but I do not think 150 promising starts is all that bad.

*Chairman*

297. If you had found 400 satisfactory proposals you would have financed them?

(*Mr Murray*) We would have been prepared to go to Ministers and say, "Look, we think this is a scheme which is a greater success than we anticipated and we think we should expand it." I am in a rather tricky position because we have

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announced a programme which will finance 150 a year for three years, and I am merely saying as an official that this is what we believe we should have done had there been a greater response.

*Lord Kearton*

298. Who helps you with the assessment of the ideas? Is the assessment of these things done entirely in-house, or do you have outside assessors?

(*Mr Murray*) It just so happens that one of your Specialist Advisers is the chairman of the largest panel.

*Chairman*

299. You have a panel of industrialists?

(*Mr Murray*) Yes. The whole scheme is run in the regions, not from headquarters. Each DTI regional office sets up its own arrangements for reviewing proposals. Oscar Roith chaired the southeast region panel.

300. You estimated that about 150 was about right for the scheme and you got finance for it. In that sense, there was no shortage of finance limiting what you wanted to do. Does that apply to collaborative programmes? Would you like to see a higher ceiling of financial commitment?

(*Mr Murray*) We are trying to develop a market in collaborative research in areas where no such market has existed. I am sorry to keep returning to it but it is rather a key DTI theme. In principle, we could spend more money than we have spent, but there would clearly be a ceiling on that.

*Lord Gregson*

301. Clutching at straws for possible sources of money for R&D, paragraph 23, where you talk about defence, seems to paint an interesting picture of getting together with the MoD and exploiting the R&D on defence. That is not the way the MoD sees it at the moment; they have a declared policy of drastic reductions in funded R&D, and the Bernini Agreement signed only a few weeks ago has given rise to a programme called EUCLID—which is a European co-operative effort—which will be totally unfunded, so if the MoD dries up as a source of support for R&D, does it not knock one of your legs away?

(*Dr Coleman*) There are areas which we do jointly fund with the MoD—for example, some of the research at RSRE at Malvern and RAE at Farnborough which has both a military and civil application. We have been doing that for some considerable time and we plan to go on doing it for a few more years; we are not planning to stop it.

*Lord Gregson*

302. That is not the policy of MoD now; the MoD are persuading industry to pick up the funding for all their projects through what was said by Tom King on Friday afternoon.

(*Dr Coleman*) But that is not what is announced in the Public Expenditure White Paper.

303. It will be in April; we will then know what the policy will be.

(*Mr Murray*) I do not know the details of this, but as regards the future of the defence research establishments through the new defence research agency, as opposed to private venture development, the MoD will certainly be continuing to fund research for defence through the defence research agency.

304. I did say “funding for industry”, which is quite different from funding the defence research agency.

(*Dr Coleman*) I think you are taking what may be appropriate for EUCLID and extrapolating this across the whole of MoD R&D expenditure. I find it inconceivable that the Ministry of Defence will not continue to support R&D in industry aimed at defence procurement.

Lord Gregson] They are withdrawing from it as fast as they can.

*Chairman*

305. The CBI have made the point several times that the level of corporation tax is too high and they want it reduced. In fact, our corporation tax take seems to be a good deal higher in terms of the percentage of GDP than other competitive countries. Do you have any comment on this? Do you believe this is a significant, relevant point in regard to investment in innovation?

(*Dr Coleman*) International comparisons can be a little misleading if you do not take all the tax activities into consideration. If you compare corporation tax with the other taxes that companies have to pay—payroll taxes, National Insurance contributions and so on—you will find that the UK taxation of companies is less than in France and Germany and below the average for the EC.

*Lord Gregson*

306. Do you have figures for that?

(*Dr Coleman*) Yes.

307. Will you let us have a note?

(*Dr Coleman*) Yes, I will.<sup>1</sup> The other point I would make to illustrate my argument is that when you look at the investment by Japan and the United

<sup>1</sup>See page 59.



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States, it tends to come to this country rather than other countries in Europe. One of the reasons for that is the lower taxes they have to pay.

Lord Kearton

308. The social charges on companies are very much less than those paid by their competitors in Europe?

(Dr Coleman) I am referring to the total package.

Lord Gregson

309. The social benefits are also very much less than those available in Germany?

(Dr Coleman) But that is not what decides whether or not a company invests in this country.

Chairman

310. Broadly, you would like to see a reduction in taxation provided it goes into investment, such as innovation?

(Dr Coleman) Yes. We have given special consideration to small companies.

311. Would the DTI support the proposition made in some quarters that there should be an increased tax allowance for R&D expenditure; in other words, if you spend £100 you can get £200 of tax relief, which would encourage investment in innovation?

(Dr Coleman) The tax regime already allows you to write off R&D expenditure in the year in which it occurs. I think we would have some difficulty in persuading our Ministers that there should be a subsidy for R&D of this kind. There has been an international comparison on this point by the Treasury and Inland Revenue which concluded that there was a significant amount of dead weight if you made larger than 100% contributions to industry.

312. In your judgment, it would not be a good idea?

(Dr Coleman) I think there are some doubts about it.

313. I would like to raise a question about technology transfer. Does the UK have a policy towards the negative balance of trade in technology, and is there any resistance on the part of industry to the inward transfer of technology? Is that part of the problem?

(Dr Coleman) The licence income to this country is greater than what we pay for licences from overseas.

314. It has been suggested that we ought to take more licences than we do which would increase the speed of innovation?

(Dr Coleman) When 95% of the world's technology is outside the UK, it seems rather strange to me that a small country is not buying in more technology than it sells.

315. Is there anything the DTI can do to encourage that?

(Dr Coleman) There is something we could do, and we do a few things already. For example, we encourage missions to overseas countries to enable them to see what technology is available. We have well over 20 missions a year going to overseas countries, bringing together companies and giving them some assistance to make these missions. In May of this year I am taking a high-level mission on advanced materials to Japan. About 10 major companies are coming to see more of what Japan is doing in the area of structural materials to see if we can make some collaborative arrangements which would be to our mutual benefit. I think that is one way in which we can make industry more aware of what is going on in other countries. There has been a recent survey by CEST on how companies get their information on what technology is available outside the UK, and they tend to get it from their overseas customers. I believe there ought to be some way in which we could improve the situation, particularly for the small and medium sized company, but we have not yet found a satisfactory way of doing it. The big companies seem to manage reasonably well themselves; they devote a lot of effort to it, but I do not think enough is done with respect to the smaller companies.

Lord Kearton

316. You say you arrange these missions and hold seminars. Do you have any feedback on how effective it has been in the past?

(Dr Coleman) At this particular moment I cannot answer your question factually. Our feeling is that it has been very useful.

Chairman

317. In paragraph 26 you refer to "the far closer partnerships which are developing between companies and their suppliers." Do you believe this is a very significant issue and ought to be given more attention in order to encourage a large company to say to a supplier well in advance what standard of product it needs so it has a better chance of meeting the demand, rather than the big company going overseas?

(Dr Coleman) I think it is becoming standard practice. Major companies are improving their relationships with suppliers. The idea that you go to competitive tendering for everything and always take the cheapest is something which I do not think is generally carried out these days.

318. Are you really saying that is the general practice now throughout industry?

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(*Dr Coleman*) It is certainly the view in the DTI that we should encourage companies to have that kind of arrangement, and the most successful companies tend to have that sort of arrangement.

*Lord Gregson*

319. If I may say so, your missionary work is slightly different from the facts on the ground, but I will admit that there is one company which stands above others worldwide: Rolls-Royce. It is so good and the others are so poor that you cannot help seeing the difference, but as a general rule I think it is wishful thinking if you are saying that your missionary work—

(*Dr Coleman*) I could name many others, like BAe, Marks & Spencer and British Coal, who have excellent relationships with their suppliers.

320. British Coal comes as news to me, and I will have to follow it up with Bob Haslam.

(*Dr Coleman*) If you look at the relationship they have had with the manufacturers of their equipment over the years, I think you will come to the conclusion that they are good customers.

*Chairman*

321. If we may turn to paragraph 19, how effective are the 14 regional technology centres?

(*Mr Murray*) On the whole, we think they are developing along the right lines, but since only three have been in operation for more than two years we feel it is too soon to be sure they will be successful. What we are really trying to do is to establish them so they will be self-financing. It is a rather modest initiative, and it is early days to say how well they are doing. We have been reviewing them with independent consultants and are just about to receive the consultants' report on how they have been operating and, more importantly, how best they can be developed.

322. Can you report on the preliminary results of the evaluation of the Civil Exploitation Clause in the MoD contracts? This is related to the question of how you exploit technology developed for defence purposes which is used for civil purposes.

(*Dr Coleman*) Again, this is another area which is being evaluated at the moment. We have set up a pilot study to see how effective the addition of a Civil Exploitation Clause would be. We do not have any hard information on it at the moment.

(*Mr Murray*) We expect to study up to 300 company applications for MoD contracts as part of the exercise. The study will be completed in July.

323. Will the results of that review be published?

(*Dr Coleman*) We have not made a decision on that, but I do not see any reason why we would want to hide it.

(*Mr Murray*) But it will not be company specific. It would be our practice to publish the lessons rather than the specific results of the study.

324. Can we have a copy of the report as soon as it is available?

(*Mr Murray*) Yes.

325. Can I ask you whether you see problems in manpower—qualified engineers and scientists—restricting increases in innovation?

(*Dr Coleman*) There is evidence from talking to companies that manpower restrictions have an effect on the rate at which they can expand in some areas, and this is mainly in the area of the small companies. The big companies appear to manage very well.

326. You do not see it as a significant restriction or concern?

(*Dr Coleman*) The impression I get from talking to them is that if they are short of qualified people they pay more money and get them.

(*Mr Murray*) The one area where that probably is not true is information technology; there is a perceived shortage there.

327. Do you work very closely with the DES in looking at any problems which might arise in this field?

(*Dr Coleman*) Yes, and one particular action we took two years ago was to transfer some of our budget to them to increase the number of courses in information technology.

*Lord Gregson*

328. There is an ACOST sub-committee looking into the problem in its broader aspects. Presumably, you are taking part in that?

(*Dr Coleman*) There is an ACOST study on the science base.

329. I thought it was wider than that. Am I wrong?

(*Dr Coleman*) You are probably right. There are very many studies going on.

*Lord Kearton*

330. The last company chairmanship I held was nine years ago. At that time we were very worried about competition from Germany and the United States. At that time, the German mark was just over five to the pound, and the dollar rate was 2.40. We still survived. According to your account, we had a brilliant decade in the eighties, but we are now in a situation where the dollar rate is 1.60, or thereabouts, the Deutschemerk is down to less than 2.75, the rate of investment has dropped like a stone and we have an enormous balance of payments deficit?



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(*Dr Coleman*) I think the best description you can have of the present financial situation is that given by the Chancellor of the Exchequer yesterday.

331. You have probably gathered from the questions we have been asking that we are worried. We have a reputation for being worried, and it is usually brushed off by the Government as just nonsense. About five years ago we made a report showing how the balance of payments had deteriorated sharply, and the Chancellor sharply dismissed that as absolute rubbish. Then we got worried about inflation and we were told it was just a blip, and yesterday the Chancellor said it would be pretty high this year and might come down next year. I ask a personal question. Do you share the Committee's worries, or do you take a more complacent view?

(*Dr Coleman*) Lord Kearton, when I am sitting here I do not have any personal feelings.

(*Mr Murray*) There is just one point which is a partial solution, and that is foreign companies investing in the UK. That is quite an important area. In one particular industry—the motor industry—that will be a major factor in the 1990s in the balance of payments.

332. If I may say so, I agree. Lord Butterworth and I were on a committee looking at this last year which said that everything must be done to encourage Japanese inward investment in the UK, not only because of profit and their manufacturing techniques but also their relationships with the work force. There has been for example a turn-round in the deficit in televisions sets. One might say, “Thank God for the Japanese. The only way to ensure that our trade deficit comes down is to have more and more inward investment from Japan”. Whilst it is very much welcomed in the sense of saving our bacon at one particular point, is it not a rather severe reflection of the performance of our own industrial policy over the last 10 years if we have to say that?

(*Dr Coleman*) I think you should not expect any country to be successful in all areas. The Japanese are not successful in everything; the United States are not successful in every area.

333. I read a leader recently saying that the Japanese are now going to concentrate on aerospace. That has been a great success story for us; we have a £2bn export surplus. The Japanese are in all sorts of things, and they are involved in technology transfer, and their Ministers have said quite plainly that they want to make Japan dominant in the next few years in the aerospace industry, just as they have done in motor cars, and so on. Does it not worry you?

(*Mr Murray*) If I may try to give a partial answer, first, the successful UK-based companies are themselves investing overseas. There is a process of

specialisation tending to occur which is company-based, not necessarily country-based. If we were uniformly shrinking then it would be a matter of great concern, but we are not; we are investing strongly overseas. Secondly, we would not get Japanese companies investing here if we did not provide the right environment, and on the whole it is not money which lures them; it is the fact that we have a good science base and good engineers. In some areas, we have adapted special courses to provide a trained work force for the people coming in.

334. The overseas investment from this country last year was about twice as much as the inward investment. As a country, we are, relatively speaking, disinvesting. I think the figures show that something like £35bn-£40bn is invested overseas and £17bn-£18bn is invested inwardly, including the Japanese, Germans, Americans and everybody else. Whilst the Japanese, Germans and Americans are investing here, we are investing overseas at twice the rate.

(*Dr Coleman*) That is the nature of successful companies. ICI will set up research—

335. We had evidence last week from witnesses from the CBI who said that the successful companies looked at bottom line and the investments they were making were related to bottom line, and if an improved bottom line position had an adverse effect on the balance of payments deficit that was too bad; that was a worry for the Government. We have a situation where we already have about 25% of our manufacturing industry in foreign hands, and the present trend indicates it will go to about 50%; there is a projection showing that in 2005 and 2010 about 50% of our manufacturing industry will be in foreign hands. It may be more efficient, but do you think that essentially it is a good thing to let it go on indefinitely?

(*Dr Coleman*) I do not think the Department of Trade and Industry worries too much about the ownership of companies.

Lord Gregson] Dr Coleman has just said that there was at least 5½% invested in the productive sector last year.

*Chairman*

336. A 5½% increase in investment?

(*Dr Coleman*) Yes; there was a 5½% increase in investment in manufacturing industry in 1989.

*Lord Gregson*

337. That does mean there must be some disaggregated figures somewhere. If that is so, can we have a copy of those figures?

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(Dr Coleman) I will provide figures.<sup>1</sup>

Chairman

338. I would like to ask a general question about DTI policy. As far as mergers and takeovers are concerned, they are referred to the Monopolies Commission when it appears there will be a substantial reduction in competition. Have you ever considered within the DTI whether there is not too much competition in an industry, to such an extent that insufficient profits are made in order to provide the resources for investment? Have the DTI ever considered that it might be a good idea to introduce the criterion whether the total output in manufactured goods will increase or decrease as a result of the particular merger?

(Dr Coleman) Whilst it is true that competition is the usual reason for referring mergers and takeovers to the Monopolies and Mergers Commission (MMC), there are other reasons which can be given, if required.

339. Such as the volume of output?

(Dr Coleman) I am not sure about output, but certainly one of the reasons you can give is a concern about the effect on R&D expenditure.

(Mr Murray) My Lord Chairman, you asked whether we had ever considered if there could be too much competition. If we did, I do not see how in competition policy terms, in relation to referring proposed mergers to the MMC, if there was a merger or series of mergers, we would be likely to be concerned about it.

340. Simply on the "merger" point?

(Mr Murray) Yes. As to the question of output, that might be something which the MMC itself would take into account in examining the likely effects of a merger, but I would not expect it to be the prime consideration in deciding whether or not to refer the proposed merger.

Lord Kearton

341. Does the Department try to do any forecasting of what the balance of trade will look like in, say, the next 10 years? It is thought that we will have a positive balance in the motor car industry, thank God, in the 1990s. If we take energy as an example, the Chairman of British Gas has been saying recently that he has sufficient gas supplies for the next seven years and is already putting in hand measures to secure supplies from overseas, and the

proposed combined heat and power programme will be fuelled by natural gas. He envisages that there will be major imports of natural gas to keep that programme going, so although the oil supply is roughly in line with demand for the moment, nobody assumes that we will remain self-sufficient for long, certainly not for another 10 years. During that period, prices will inevitably go up. Is there anybody in the Department looking at the long-term trends and at what the situation might be in future, making due allowance for the hazardous nature of such speculation? Has such an exercise been contemplated?

(Dr Coleman) I think that is an exercise certainly contemplated by the Department of Energy.

342. But energy is just one example; you are in a sense responsible for general trade affairs. Is there anybody in your Department looking at the picture in 2000, 2005 and 2010? If we arrive at a situation where we have a much greater deficit there might be some urgency in getting more manufacturing capacity in order to pay for the essential imports we will need in the next 10 years, especially energy?

(Mr Murray) In my experience DTI does not do predictions like Lord Kearton suggests, but this is outside Dr Coleman's and my field. Even if we did do them we would have to tear them up because of the huge uncertainty about how markets in eastern Europe will develop over the next decade.

343. One of the things which has come out of the answers which have been given—and mention has been made of regional technology centres—is that this is a long-term matter, that we must view these things in that way. You are not expecting all of these different initiatives to make a great deal of difference in the next five years?

(Dr Coleman) In the area of collaborative research you are right, but we do have long-term views in other areas: for example, what is likely to happen in the office—particularly IT systems—or in the car by the year 2000. Those sorts of studies are ones which often give an indication of the likely important technologies in which one might encourage companies to invest.

344. If I may say so, it strikes me as a very sensible reply. You move away from the pure market and see how you can influence investment?

(Dr Coleman) Yes.

Chairman

345. Would it be fair to sum up the DTI position as follows, that you regard the balance of payments deficit on manufactured goods as very serious, and you believe an increase in manufacturing output is required to which increased innovation will make a substantial contribution. You believe that this is

<sup>1</sup>DTI subsequently provided extracts from OECD National Accounts (published 1989) for UK, France, Germany and USA which break down investment into nearly 30 industries, including 9 manufacturing industries; together with an extract from CSO Businesses Bulletin (23 March 1990) which gives a breakdown of UK manufacturing investment by asset—new building work, vehicles, and plant and machinery.



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and MR B MURRAY*[Continued**[Chairman Contd]*

manufacturing industry's job, and the Government is doing all it can to create the right climate to encourage industry to carry out that task?

*(Dr Coleman)* I think you are putting into my mouth a rather complacent picture. I do not think we are saying we are doing all we can, because there will always be things you can do. For example, one of the important things to tackle in the next few years, for which we have not yet developed a framework, is the general perception of technology in this country. That is perhaps an area where there is a need for more work to make sure the climate is as favourable as possible. Looking at what is happening in Germany, I think the strength of the green parties and the balance of power that they hold is having a serious impact on industry there. In my view, there is a lack of understanding of the

balance between what is necessary to encourage innovation and to improve the quality of life and the quality of the environment. This is a serious area of concern where we and industry need to come together and learn from each other so we can improve the public acceptance of technology.

346. An improved environment and quality of life is dependent on a prosperous and growing manufacturing industry?

*(Dr Coleman)* Yes; we need to get the balance right.

Chairman] Our objectives are clear, and perhaps the only difference is in whether or not we think enough is being done to achieve it. Thank you very much for answering all our questions.

## Information Supplementary to Question 307

This information has been supplied by the Inland Revenue. Treasury Ministers are responsible for tax policy.

Table A shows the corporate tax rates in the United Kingdom, France and West Germany in 1983 and 1987.

Corporate tax rates do not provide the full story about corporate taxes because they do not take account, for example, of various reliefs or other deductions that are available.

Corporate tax is not the only payment made by companies to governments. Table B shows corporate taxes, employers' social security contributions and payroll taxes as a percentage of GDP for 1983 and 1987. The table covers the United Kingdom, France, West Germany and the EC average. The source is OECD Revenue Statistics 1965-1988 Tables 12, 18 and 20. The terms used are explained in the interpretative guide in that publication.

International comparisons need careful interpretation and can be misleading. For example, corporate taxation statistics are affected by major factors such as the size and importance of the corporate sector in a particular country. The figures in Table B show the position as far as possible on a comparable basis but necessarily they cannot take all relevant considerations into account. The figures for employers' social security contributions include, for example, all contributions and not just those paid by the corporate sector. Some taxes on property and on goods and services will also be paid by companies.

TABLE A  
*Main rate of Corporate Tax*

	UK	France	West Germany Distributed Profits	West Germany Retained Profits
1983	50	50	36	56
1987	35	45	36	56

TABLE B  
*Corporate Taxes, employers' Social Security contributions and  
Payroll Taxes as percentage of GDP 1983-1987*

	UK	France	West Germany	EC average
<i>1983</i>				
Corporate taxes	4.1	2.0	1.9	2.7
Employers' SSCs	3.4	12.4	7.1	6.5
Payroll taxes	0.5	1.0	—	0.3
Total	8.0	15.4	9.0	9.5

*Source:* OECD Revenue Statistics 1965-1988 Tables 12, 18 and 20.

	UK	France	West Germany	EC average
<i>1987</i>				
Corporate taxes	4.0	2.3	1.9	3.1
Employers' SSCs	3.5	12.2	7.2	6.7
Payroll taxes	—	0.9	—	0.2
Total	7.5	15.4	9.1	10.0









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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 4 April 1990

FELLOWSHIP OF ENGINEERING

*Mr P C Ruffles, Mr J E Pateman, Mr V J Osola and Mr M J Neale*

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WEDNESDAY 11 APRIL 1990

Present:

Caldecote, V (Chairman)

Chorley, L	Kearton, L
Clitheroe, L	Taylor of Gryfe, L
Erroll of Hale, L	Whaddon, L

**Memorandum by The Fellowship of Engineering**

The Fellowship of Engineering wishes to comment on questions posed by the Sub-Committee in connection with its enquiry into the obstacles to innovation in manufacturing industry and the conditions which stimulate it.

Being a collation the following paper cannot reflect the views of all contributing Fellows nor those of The Fellowship as a whole. It may, however, be regarded as representative.

**SUMMARY OF MAIN POINTS**

1. Successful innovation is market-led.
2. Companies cannot act in isolation. Company culture, the market environment, Government policy and City expectations all influence attitudes to innovation. In the UK the overall effect is restrictive.
3. Innovation only thrives when the company climate is supportive and when all the resources of people and equipment are in place in a hospitable environment.
4. Innovation in small companies is much more difficult to support than it is in large multi-national companies. However, it is often in the small companies that the most novel ideas originate.
5. The most successful manufacturing companies have Chief Executives and Board Members with professional qualifications in science and engineering. Britain lags behind countries such as France in this respect.
6. UK companies, particularly the larger ones, actively seek out external technology both at home and abroad. Licensing agreements are common and useful but licensing must not be regarded as a cheap alternative to in-house innovation.
7. The roles of product development and production engineering in innovation are equivalent and should be inseparable. The successful UK manufacturing companies recognize this but production engineering is still widely overlooked.
8. The major cost of innovation lies in product preparation and marketing, not in demonstrating feasibility or in pre-competitive research. It is usually only the latter which is sponsored by Government.
9. Government support for innovation is not good. This reflects a failure in Government departments to understand how business and markets function. Japan does significantly better.
10. Innovation and scientific research are not the same thing and Government should attempt to balance expenditure between them.
11. Companies which try to be innovative have an uphill struggle in winning the support of the city. Unfortunately, companies which do not innovate have no guarantee of future markets. A change of climate is desirable. The role of West German banks in fostering innovation provides an interesting contrast to UK practice.
12. The EEC Single Market should benefit UK manufacturers by increasing the size of the 'domestic' market and thereby reducing the need to sell in hostile environments. This righting of the balance with the USA and Japan should aid the development of an environment in which innovation can flourish more easily.
13. There are occasions when legislation can stimulate innovation.
14. It is difficult to accurately describe the effectiveness of the mechanisms for technology transfer from HEI's, Research Councils and public laboratories to manufacturing industry. Fellows believe it is 'good in parts'. Technology transfer appears to work well with techniques but less well with product innovation technology.

*4 April 1990]**[Continued*

15. Insufficient is known in the UK about the support available for innovation from the European Commission.

16. The much improved relationships of recent years between suppliers and companies are extremely important to the furtherance of innovation, particularly where risk sharing is involved. Monopolistic customers who have dictated too much to manufacturers in the past have frequently stifled innovation.

17. Decisions to innovate in the UK or overseas are primarily influenced by market conditions, labour costs and the availability of expertise and the degree to which management control can be maintained.

18. Most economically important innovation is based on scientific knowledge acquired some years before the innovation takes place. The main exceptions are those which are defence related.

19. There is little evidence that the relationship between the defence and civil sectors has improved as a result of the ACOST report, "Defence R&D: A National Resource".

1. *What are the effects of company attitudes and structure (including personnel policies, investment decisions)?*

1.1 Successful innovation in manufacturing industry is entirely dependent upon the right climate being established within individual companies. This climate is undeniably a product of company attitudes and structure.

1.2 Realistically, attitudes within a company develop as much in response to external factors as to internal ideals. Thus, attitudes are influenced variously by company culture, the market environment, Government policy and City expectations which, in the UK, have all militated against investment in innovation. Short-term financial objectives can take precedence in such an assessment, particularly in areas such as power generation. In consequence, even in companies where the attitude towards innovation is very positive, progress is made under continuous restraint.

1.3 It must not be forgotten that in the UK there are now very few companies in the manufacturing sector which are wholly British in ownership, scope of operation or location. This is an inevitable consequence of the increasingly global nature of large-scale industry and there is no reason to suppose that this trend will reverse. In consequence, investment decisions will be taken against a global backdrop in which the owners of companies will consider, inter alia, personnel policies, relative international fiscal issues and the 'cost of money'. Trades union behaviour will also be viewed critically. In such an environment UK managements often view conditions overseas with some envy.

1.4 Without wishing to dwell too long on finance it must be said that the relative costs of borrowing in the UK do have a significant negative effect in terms of expenditure on machinery, systems and people. Inevitably this tends to hinder innovation in manufacturing industry.

1.5 If innovation is to take place successfully in a company, it must be market led and the company must have a high production efficiency in order to afford expenditure on R&D whilst still being able to sell competitively and make an acceptable profit.

1.6 In successful innovative product development, structures play an important part in the vital inter-action between the engineer and the marketer or product planner. Frequent informal contact between these disciplines has to be fostered by co-location and management structure.

1.7 In a small unit the support of the Chief Executive and Management team for any major development is of crucial importance. In a larger company, such involvement may have to be delegated to a divisional level. In either case the key people must be in a position to take into account all the factors, including technical factors, which can influence the business success of the company. (A fact recognised by the Finnieston Report as the Engineering Dimension in Board Room Thinking).

1.8 It follows that these 'catalyst' people must be fully aware of the importance of technical factors in long-term corporate planning. Optimum decisions on investment in innovation, modernisation of manufacturing facilities, recruitment and training can only be taken if the Board or management understands the technical aspects of the business.

1.9 The qualifications and professional background of the Chief Executive are also important. The most successful manufacturing companies in the UK and elsewhere often (but not always) have Chief Executives whose initial training was as a Scientist or Engineer, thus affording them an insight into the business they seek to manage. This practice is exemplified particularly well in France, where it is the norm.



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1.10 Personnel policies based on professional growth and reward for performance and technical achievement encourage innovation. In consequence, an emerging trend in the UK is the growth towards organic or cellular organisational structures which also stimulate innovation. It must be admitted, however, that this represents an ideal which is found only in the most forward thinking of British manufacturing companies.

1.11 Personnel policies will be of vital importance in the next decade and many improvements have to be made if the best people are to be attracted to manufacturing industry and then retained. Such matters as the decline in demographic trends do have important implications for innovation.

1.12 A recurrent theme in this and subsequent answers to the Sub-Committee's questions is that innovation depends on well-managed companies having, above all else, the best possible people to hand. In comparison with basic and applied research very significant numbers of people are required in industry to carry through development and application. Some comments on the attractions of manufacturing industry for school leavers are, therefore, relevant to this enquiry.

1.13 Within schools there has been a decline in the number of 'A' level students taking technically oriented subjects. In contrast the German Abitur (school leaving exam), in which German, mathematics, a foreign language, history and a 'hard' science (physics or chemistry) are compulsory at 18 or 19 ensures a potentially larger recruitment pool for industry and a more technically literate population as a whole.

1.14 The presentation of manufacturing industry to schools has generally been very poor. Unattractive plants and unappealing advocates of industry have done little to excite interest.

1.15 The subject of personnel policies also includes such matters as low salaries, the inadequacy of training and retraining and overall the recognition which engineers deserve but rarely achieve. A failure to properly discriminate between engineers and technicians remains common place. More often than not these are features of the many small and medium sized companies in Britain which lack the organisation to insert real innovation.

1.16 To sum up, attitudes and company structure are of crucial importance in the fostering of innovation. In Britain the larger and multi-national companies generally have appropriate cultures in place to nurture the brightest talents in innovation. The same cannot generally be said of medium and small companies where innovation is often an unaffordable luxury or a risky gamble.

1.17 And finally, an important company attitude is a tendency not to place a real value on the company's product technology. This includes a long term understanding of the technical market situation, operating conditions of the product and past service experience, all blended into the product design process. This has high value which is not reflected on the balance sheet.

2. *How active are UK companies in seeking out external technology, especially from overseas? How well do they adapt and apply it?*

2.1 There is no general answer to this question. Much depends on the type of industry and company size. Broadly the larger UK companies are as active as any of their counterparts overseas in keeping abreast of developments at home and abroad. This process is further simplified in the truly international companies. The perception among Fellows is that the smaller UK companies are not active to the same extent.

2.2 Within the UK most of the large, many of the medium and a few small companies already have industrial contacts with tertiary education in the UK and the benefits are significant. Encouragement of personnel secondments should be high on the agenda for any action plan with special emphasis on those from educational establishments into Industry. These are very limited in scope and number at present.

2.3 Today, however, external technology is as likely to come from overseas as from the United Kingdom and it is generally true that most successful British manufacturing companies are very active in seeking it out. The methods by which such technology is brought into the UK take several forms and help is also available from DTI schemes such as the Visiting Engineer to Japan Scheme (administered by The Fellowship of Engineering). This enables young engineers to experience foreign technology at first hand and to overcome the 'Not-invented-here' syndrome.

2.4 In the development of electronics equipment the major impact of external technology is in the availability of advanced components, particularly in the semiconductor field. Most relevant innovative developments come from the USA and Japan. Most UK companies can easily keep in touch with activities in the United States via the wide-spread distribution of technical literature and aided by the common language. It is less easy to monitor events in Japan remotely. The response of the most resourceful UK companies is to maintain a presence in Japan or to send fact finding missions. Contact with Japanese companies operating in Europe is also beneficial.

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2.5 The aero-engine business does not operate in such a compartmentalised way. Its infrastructure is global and, in consequence, any one producer cannot easily gain ascendancy over another when multiple innovative ideas originate from all parts of the globe. A large element of technology originates in the supplier network which serves the industry worldwide although the USA attitude to technology transfer can handicap UK industry.

*3. What are the respective roles played by product development and production engineering in technological innovation?*

3.1 It is now widely recognised by leading companies in manufacturing industry that the roles of product development and production engineering in innovation are equivalent and should be inseparable. Integration should start at the research phase and continue during product development. In the process industries this has always been well understood and the development of products and the processes for their manufacture is carried out in a closely linked fashion, frequently by the same technical people. In the manufacturing industries, however, this important link has not traditionally been as widely recognised as it should have been and it is only in recent times that many companies have set in place organisational arrangements to bring the two activities of development and engineering back together. Reflecting this change phrases such as 'Simultaneous Engineering' are now in vogue. The whole process has been aided by the blossoming of Information Technology which has dramatically improved the potential for communication.

3.2 It must be acknowledged, however, that the ideals described above are not universally applied in the UK. In particular, production engineering, although extremely important, is still widely ignored. It is largely overlooked by Government, not many Universities teach it and it has low status in the perceptions of graduate engineers. New scientific knowledge can only impact on the market place when production techniques to allow manufacture at acceptable cost and quality have been developed.

3.3 It is noteworthy that, in the experience of some Fellows, few development contracts placed by the MoD provide any funds for production engineering, a signal omission in view of the large sums spent on military programmes and the benefits which might accrue.

3.4 In any assessment of the respective roles of product development and production engineering it is important to recognise that the really key role is Product Design. This links the market need to a good product which can be made profitably by matching the design to the production methods. This is engineering design.

*4. How effective are the activities of Government departments in promoting and supporting innovation?*

4.1 Government departments are not good at promoting and supporting innovation and the situation is worse now than a decade ago. This is largely a consequence of the current philosophy that if there is a market opportunity then industry should do the necessary innovation.

4.2 Unfortunately, this is an unrealistic view because of the timescales and effort involved and because much innovation is generic. Support for innovation involves the distillation of research results and service experience to obtain better design methods for common components together with a full understanding of how they work and how they can be manufactured. This activity is totally different from research, although research results contribute to it.

4.3 Where Government does provide support to manufacturing industry this is principally in the areas of fundamental research and development. However, innovation generally occurs later in the product development cycle. This is where Government support is not forthcoming and where short-term business concerns restrict the availability of funds. In particular, the development of new manufacturing processes suffers for this reason.

4.4 Other countries, principally Japan through MITI, have been much more successful than Britain in encouraging innovation. A key factor in such cases is the existence of a National Plan setting out Government's long-term technical policy in key areas. The absence of such a policy leads to uncertainty for industry and investment in innovation.

4.5 In the UK a very important problem with Government departments, in general, is their remoteness from the market place and the realities of competitive business. Furthermore, few of the senior staff of the relevant departments have held executive positions in industry and therefore do not have the knowledge or experience necessary to promote or support innovation. This lack of understanding is perhaps seen at its worst in the promotion of the various co-operative development programmes.

4.6 This enthusiasm of Government for the encouragement of consortia reflects a curious lack of logic. If a company cannot afford the pre-competitive research then it certainly cannot afford to place the product



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in the market place. The cost of launching new and innovative products is certainly increasing and the solution to this may well be the formation of more permanent alliances so that they can more easily afford the entire innovative process and also secure access to the larger market place which will be required to recover the costs of such innovation. Government can help by encouraging such alliances and most of all by purchasing the resulting products.

5. *What are the effects of City attitudes to investment in innovation?*

5.1 Investment in innovation carries more than a degree of risk and timescales of five to ten years, or more, are commonplace. It is inevitable, therefore, that there will be a conflict of interests between the City and innovative manufacturing companies.

5.2 Fellows of The Fellowship of Engineering reflect this dilemma. Some hold that the attitude of the City is disastrously short-sighted but an equal number is prepared to see City attitudes as understandable in a fully free capitalist market where innovation in manufacturing is not the prime objective.

5.3 City ambivalence can be simply stated. The City likes companies to innovate and produce new products but does not like the effect which this has on the "bottom line" or time scales. Inevitably, profits will be lower than they would otherwise have been, in the short term, if expenditure on innovation is incurred. A consequence of this has been a willingness of the City to support opportunistic bids for companies with a good record of investment in innovation and a good long term future. Pilkington provided a case in point where, fortunately, their case based on investment in the future was eventually accepted.

5.4 It is, in consequence, arguable that City attitudes to investment in innovation are not negative provided that such investment can be shown to yield acceptable profit. This view has some support among Fellows although even here the caveat is made that the City seems to understand large scale businesses better than the smaller ones. Unfortunately, it is often at the small scale that many innovators operate, frequently on their own. For such people there may well be a lack of knowledge of what is available for the smaller operations. While many of the Enterprise Agencies are doing an outstanding job the total coverage is inadequate on a UK-wide base.

5.5 Possible ways of improving the UK situation and changing the climate so that innovation can thrive include the following:

- (a) Allow dividends to be tax-free up to a level related to a function of the expenditure on research and development and innovation.
- (b) Deny shareholders the opportunity to vote at General Meetings until they have had their shares on the share register with the ultimate owner nominated for a period of, say, 12 months.
- (c) Require a majority of 60 per cent before a hostile takeover bid can be effective.

6. *What is the effect of the legislative and regulatory framework concerning, for example, labour costs, patent laws and tax concessions on R&D and the purchase of know-how?*

6.1 It is axiomatic that the legislative and regulatory framework should encourage industry to build and develop resources and an environment where innovation can flourish.

6.2 Tax concessions on R&D and acquired 'know-how' would be very helpful. Since the development of new and improved products is essential to any continuing business the costs incurred should, at the very least, be regarded as legitimate costs of the business. This is not so, for example, with regard to capital investment for innovation or otherwise. Costs of development and production engineering could be allowed against corporation tax at a premium rate and the depreciation of capital equipment in its year of purchase could be of assistance to industrial innovation.

6.3 The domestic market in the UK is one of the most open in the world and it is, in consequence, not surprising that the market leader in most forms of innovative product is a foreign company. The restricted size of the UK home market requires a typical UK company to seek perhaps 80 per cent of its sales in less friendly overseas environments. By comparison a comparable US or Japanese manufacturer may seek only 40 per cent of its business internationally. A UK company is thus obliged to pay much greater heed to the constraints of tariff barriers, currency, open or concealed domestic preference, trading practices, established supplier relationships and many other hurdles. It is to be hoped that the arrival of the Single Market in 1992 will go some way to restoring balance.

6.4 One of the consequences of the Single Market should be the harmonisation of regulations and their application throughout the Community. In a somewhat perverse way this should benefit UK manufacturing companies which, over recent years, have often been required to respond to more rigorous standards than their EC counterparts. This has been so in the case of safety, for example, and by extrapolation it can be argued that regulation can be seen to have equal impact on innovation.

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6.5 Conversely, it can be argued that there are occasions when legislation actually stimulates innovation and it is certainly the case that many developments have come about as a result of trying to meet increasingly stringent regulations. Examples include vehicle emissions, noise abatement and health and safety. Legislation can thus provide both carrot and stick simultaneously.

*7. How effective are the mechanisms for technology transfer from HEIs, Research Councils and public laboratories to manufacturing industry?*

7.1 It is not possible to give a simple answer to this question as so much depends on the expectations and experience of individuals and companies in the manufacturing sector. Overall the attitude of Fellows can best be summed up with such phrases as 'good in parts' and 'lukewarm in general.'

7.2 The lack of a suitable method of measurement makes discussion difficult. On the one hand it is probable that any external analysis of manufacturing industry participation with the bodies referred to would indicate a high level of cross-pollination. Whether this is demonstrably beneficial and whether there is a better way of arranging links are quite different questions with no obvious answers. It would seem that those who know about the existence of avenues of contact use them effectively. This, in turn, reflects on the competence of managements.

7.3 Certainly, some improvements have occurred in the HEIs, where the appointment of Industrial Liaison Officers is now common-place. As a bridge between the Universities and Polytechnics and industry these have, on the whole, worked well and have generated substantial income for the HEIs.

7.4 Equally, the establishment of AIRTO (Association of Independent Technical and Research Organisations) has been a useful additional step in strengthening the links between Research Councils and Industry.

7.5 Links between Public Laboratories and Industry have been mixed in their effectiveness. Some, such as the Centre of Tribology at Harwell and NPL, have developed excellent relationships with industry. Others, such as NEL at East Kilbride, have not done as well. One reason for cases such as the latter could well be a matter of motivation. Government bodies which receive a large part of their income from Government departments are bound to treat industry with a degree of off-handedness.

7.6 Specifically in relation to innovation in manufacturing industry it has been argued that the technology transfer process works well for techniques, as in calculation and measurement, which can be used in an HEI or industry with little change. The transfer of product innovation technology is much less efficient because only rarely, as in pharmaceuticals, is there a direct correlation between research results and a product. In engineering products it is frequently the case that the results of many research projects need to be coalesced to produce a transferable item of product knowledge.

*8. Does the UK benefit sufficiently from EC support for innovation? How might it be improved?*

8.1 The UK does not benefit as much as it could from EC support although it must be said in relation to innovation that most support tends to be focussed in the areas of pre-competitive research and development. Nevertheless, this is a good means of establishing closer links with HEIs. Community support for innovation suffers from the same drawbacks as that of the UK government and shares a similar predilection for co-operative schemes.

8.2 The main benefit which product innovators might seek to achieve through the EEC is the rapid fulfilment of the Single Market, thereby providing the advantages of the large domestic markets available to US and Japanese competitors. One important handicap in this process is the lack of a common language.

8.3 However, language need not be an insurmountable obstacle and those companies which have been successful in obtaining EEC support have been those who appointed multilingual personnel in Brussels whose task it is to become fully familiar with all EC schemes and their administrators. There is a belief that UK industry does not, on the whole, make as much use of EC schemes as some of our European competitors. The responsibility for this lies directly with industry itself.

8.4 There is a widespread belief among Fellows of The Fellowship of Engineering that insufficient is known of the potential for support from the EC. This applies particularly to small and medium sized companies for whom the high cost and effort involved in securing EC funding can be overwhelming. It may be that learned bodies such as The Fellowship can help in this area. Similarly, there may be a case for strengthening the offices of the Science and Technology Counsellors in British Embassies overseas. Such counsellors are only to be found in Washington, Tokyo, Bonn and Paris.

8.5 If the Single Market is a success then it is possible to look forward to the development of a strong European manufacturing base in which the UK has a strong interest. Looking forward to that time it must be concluded that the EC could and should be providing a framework for direct funding during the innovative phase of the product development cycle and the supporting manufacturing technology.



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9. *What are the effects of the varying relationships between Companies and their Suppliers?*

9.1 Fellows overwhelmingly support the fairly recent trend towards long-term collaborative relationships between companies and suppliers, particularly where these include some degree of risk sharing. Such relationships are perceived to result in benefits for both parties and in increased market success. Traditional adversarial relationships are undoubtedly to the detriment of both innovation and quality. The former arms-length relationship of purchasing only from the lowest price supplier is outmoded and was damaging to the performance of the customer company.

9.2 Manufacturers are more inclined to innovate when customers leave them to determine their own policies in the face of global market forces. When monopolistic customers use their power to dictate the way in which manufacturers should develop this can have the effect of stifling innovation. This has been one of the revelations arising from the privatisation of former State monopolies and is being experienced again in the period prior to the change in ownership of the electricity supply industry. The effect here has been to make UK manufacturers appear devoid of innovative products.

10. *What factors influence decisions to invest in innovation in the UK or overseas?*

10.1 Three principal factors influence the choice of location for innovation investment: the availability of a Market, labour costs and availability of personnel expertise, and the degree to which management control can be maintained.

10.2 Invariably, the drive for innovation will be guided by market needs. However, there is a reluctance among companies to establish research and development away from the principal home base because of difficulties in maintaining management control. Consequently, some Fellows have observed that in some cases market advantages would need to be overwhelming to offset the difficulties of local management and to induce a decision to invest in innovation overseas.

10.3 However, Fellows detect a trend towards overseas investment in emerging countries which have low labour costs and Governments keen to give substantial financial support to encourage innovative activities. For example, some companies are already transferring software development to India and the newly emerging independent nations in Eastern Europe may well be attractive for research and development work over the next few years.

11. *In the light of ACOST's report "Defence R&D: A National Resource" and the Government's response, is there a satisfactory relationship between the defence and civil sectors?*

11.1 It is the unanimous opinion of Fellows that the relationship between R&D in the Defence and Civil sectors is not as healthy as it could be. Although this issue was addressed in the ACOST report's conclusions and recommendations there is little evidence that positive and beneficial action has resulted.

11.2 Those who are deeply involved in defence-related work, for example in the aero-engine business, are convinced that the benefits generated from defence programmes are applicable across a host of products with considerable spin-off value to civil activities. From this standpoint it is possible to state with certainty that investment in manufacturing processes could yield significant cost savings in the defence budget as well as improving the overall competitiveness of manufacturing industry.

11.3 Opinions on this subject do vary in emphasis according to the nature of the business in which Fellows are engaged. Thus, whilst there is general agreement that cross-pollination between civil and defence activities should and could be greater, opinions differ on whether the possibilities are as wide-ranging as is often supposed. A cautionary view is that timescales in major defence programmes are much longer than those involved in comparable civil programmes. This occurs partly because there are few commercial outlets for many areas of defence technology and partly because the way in which defence equipment is now procured makes it vitally important for the manufacturer to avoid risk if the fixed price contract is to be completed at a profit.

11.4 What is undeniable, however, is that other countries have used their Defence R&D budget not only to obtain defence hardware but also to underpin the R&D facilities in the civil sector of their manufacturing industry. This has proved highly beneficial and a notable example is in the US Aircraft Industry. The contrast with UK experience and practice suggests that the Government in the UK could do much more to help.

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[Continued

*Examination of Witnesses*

MR P C RUFFLES, Technical Director, Rolls Royce, MR J E PATEMAN, Deputy Chairman, GEC Avionics Ltd, MR V J OSOLA, Managing Director, John Osola and Associates Ltd, and MR M J NEALE, Managing Director, Michael Neale and Associates Ltd, all Fellows of the Fellowship of Engineering, called in and examined.

*Chairman*

348. May I welcome you all and thank you for a full and helpful paper, which we have all read carefully. Would you care to introduce yourselves?

(*Mr Osola*) Thank you, my Lord Chairman. Michael Neale is a consulting engineer of Michael Neale and Associates, Mr Ruffles is the technical director of Rolls Royce, Mr Pateman is the deputy chairman of GEC Avionics and I am a consulting engineer of John Osola and Associates.

349. Would you like to add anything in amplification of your memorandum?

(*Mr Osola*) First, my Lord Chairman, on behalf of the Fellowship I would like to thank you very much for having invited the Fellowship to contribute. We think it is addressing a very important issue. We have put together this submission and I should emphasise that it is not the universal view of every fellow of the Fellowship of Engineering; it is a distillation of views as best we have been able to do. I draw attention to the opening pages, which give a summary of the principal points that we have tried to make in the report. We will of course be very pleased to answer any questions on that or on anything else that arises.

350. A theme that goes through all the memorandum is that it is essential to have the right company culture and ethos. Would you like to start by giving any ideas that you may have as to how we can improve that ethos with the objective of increasing investment in innovation and so increasing our share of world trade?

(*Mr Osola*) As you know, my Lord Chairman, the Fellowship have been carrying out a survey of a number of successful companies, which is not yet complete. One company that I think could give very useful evidence on this point is Rolls Royce.

(*Mr Ruffles*) One important aspect is to make sure that there is a clear understanding of the role that technology, finance and the market play at board level. Deriving from that is the structure of the company. Company structures are changing quite a lot in the United Kingdom, with orientation towards business and market needs. In some companies business orientation is achieved through separate business units or divisions focusing on a particular market sector. Within companies such as my own, which is largely a single product company, namely aero engines, we are product orientated so that the groups are organised around the product rather than around a hierarchical function. This type of structure brings together a lot of the interdisciplinary groups who become focused towards the product line rather than towards a particular functional unit. The precise structure in a company is very much dependent on the type of business it is in; there is no unique solution. Having focussed on the product the other aspect to be addressed is the process, of

developing and manufacturing the product, and how to improve the efficiency of that process. To answer the question as to how companies can be improved, there is quite a strong gearing by improving the process in the company, that is, its efficiency. So as to release funds to allow the companies to develop new products. A lot of our historic funding has been focused more on product development than on process improvement.

351. But whether or not that is done depends very much on the ethos at the top of the company, does it not?

(*Mr Ruffles*) Yes, the ethos has to be right and it has to start right at the top management level. The senior management have to believe that the combination of technology, finance and market are all important. One without the other does not give the right equation. That mission can then be propagated through the whole company so that everybody in the company understands what the mission is.

*Lord Chorley*

352. Are we talking about an organisation that is much more based on team work, project related?

(*Mr Ruffles*) Yes. The other thing that comes with that is the simplification of the structure where there are fewer reporting levels and therefore direct communication between the people at the working level where the value is added to the product and the senior management.

(*Mr Osola*) One thing we have seen in our study is a general flattening of company structures, a reduction in the number of levels from the chairman down to the shop floor.

*Chairman*

353. You see that as highly desirable, and you would like to see that spread throughout industry?

(*Mr Osola*) Yes, certainly, and a number of levels removed. This has the advantage of improving vertical communication and gaining an understanding in the companies of what the corporate objectives are. Looking across the company we have also noticed a blurring and in many cases a removal of the traditional barriers between research and development and design and manufacture and so on, and the use of combined project teams, market driven, to carry through innovative developments. We think that this is a very effective way of doing it—it certainly appears to be so.

*Lord Taylor of Gryfe*

354. It may be semantics but it is probably emphasis too: in paragraph three of your summary you talk about a hospitable environment. Do you



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mean a stimulating or a hospitable environment? I do not react to the word hospitable in a motivating sense.

(*Mr Osola*) It is where innovation is welcomed and fostered.

355. Then in paragraph five the point is that most successful manufacturing companies have chief executives and board members who are scientists and engineers. You are referring to some board members, are you? You are not stuffing your board with engineers?

(*Mr Osola*) No, that was not the point. We were saying that the most successful companies that we have seen have a large proportion of well educated graduate professionally qualified people. I must say that they are mostly engineers or accountants.

356. I have seen boards with a heavy emphasis on engineering so obsessed with engineering that the rest of the company was sacrificed to their aims.

(*Mr Pateman*) Perhaps I may comment on that, my Lord Chairman. It seems to me that GEC is a very centralised company and goes very much along the lines that are being discussed. What we believe to be important is that the man who is head of a particular team—to use Mr Ruffles' expression—should be knowledgeable about marketing, engineering, finance and all such things. If you have the right man there who is knowledgeable about these things, in general it will be a good environment for innovation. It is very much a question of getting the right man in the right place.

*Lord Kearton*

357. In getting away from the old-fashioned matrix operation it seems to me that it depends on the calibre of the professional people on the board. The guy who is an expert in five or six different disciplines is an exceptional man. How do you pick and train and encourage these exceptional men?

(*Mr Pateman*) You have to train them.

358. Who is doing the training? Is it starting from the board level, having talent scouts? How are they picked out?

(*Mr Pateman*) To a large extent if you have the right company structure properly divided up people can go through the structure and are trained in the process.

*Chairman*

359. Do you think that the business schools could make a contribution to this to put more emphasis on that kind of job rather than on the planning organisational experience, as it seems to be?

(*Mr Pateman*) I am sure that the business schools have a contribution to make, but so has the basic organisation of the company.

Lord Kearton] So far business schools have not a reputation for specialising across the board; they

concentrate on finance, management techniques and so forth. That they must have an appreciation of what the business is all about is a point they seem to miss. You make the point in the memorandum that you come across boards where they know damn all about the product.

*Lord Clitheroe*

360. I have read the evidence with interest several times and I came across the word customer mentioned only three times, all in a somewhat sideways or derogatory fashion. I wondered what comment the Fellowship has to make on this and whether they would expand upon it. We have had other written evidence that relationships with customers are important and perhaps more important than any other factor.

(*Mr Osola*) That is absolutely true. We have used the term 'market-led', I think, more times than 'customer'. That is the implication. The definition of market opportunity of course involves in-depth discussions with customers to understand precisely what the requirements are. Many of the companies we have been looking at have created new technical teams to examine in precise detail what the customer wants now and is likely to want in the years ahead.

361. With respect, I think market includes customers, but customers are all important to the relationship you can develop. It seems to me the service you provide is the real key.

*Lord Erroll of Hale*

362. Rather than being hell-bent on innovation I feel that we should be examining the British public's attitude towards innovation. That may be—I would like your opinion on this—an inhibiting factor. I do not think British customers necessarily want innovation always; they would rather have more of the same. An example would be innovation to put digital speedometers into motor cars, but do the buyers of motor cars really want digital speedometers? Here is one who would rather have the old dial. In the case of the Budenberg gauge company, in which I take an interest because it is in my former constituency, I said, what about innovation; and they said, our customers do not really want anything different from the Budenberg gauge with which they are familiar and which is reliable. (They put it on oil platforms and so on.) I am sure that they would innovate if there was an interest in innovation. It may be that the Germans and the Japanese may like a lot of innovation, but perhaps the British do not. If you buy an answer-phone made by Panasonic it is so full of innovation that you cannot understand what it is all about, and the instruction book being written basically in Japanese with a rather poor English translation it is quite impossible to operate the full potential of this wonderful innovative mechanism. Can innovation go too far ahead of customer demand and customer wishes?



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(*Mr Pateman*) Of course it can, my Lord Chairman. The noble Lord has to be right on that. However, I do not necessarily agree that the British customer is against innovation. In the domestic field, for example, he has fallen over himself to buy microwave ovens and to buy video recorders and all sorts of things of that nature, which are pretty good innovations I should have thought.

(*Mr Osola*) An interesting example of a contrary view is provided by GEC Avery. About eight years ago they were producing mechanical weighing machines that were very reliable, accurate machines. It became clear that the Japanese were about to invade the market with electronic weighing machines which could then be fed into systems for printing out bills as you leave the store. They had to make a massive effort to convert the whole of their company from mechanical technology to electronic technology. It involved not just the design of new products but changing all their manufacturing processes and retraining all their people, their service personnel and so on.

Lord Taylor of Gryfe

363. Did they buy in the technology to effect this?

(*Mr Osola*) No, they developed it in-house and obtained a lot of it from GEC, their parents.

Lord Whaddon

364. I have found that the chemical industry tends to sell to a great many other industries which apparently have nothing to do with chemicals. One has encountered a demand for a chemical answer to a textile problem or a chemical answer to an engineering problem, and the commercial and finance people in the chemical company were utterly blind to that industry and had no knowledge of it so lost a very good development as a result. I wonder how we deal with this. Does our genius in charge of the company have to learn about six industries as well as six disciplines?

(*Mr Pateman*) It is a big problem and by no means peculiar to the chemical industry. It happens in quite a lot of industries. I am afraid the answer is, yes, you have to understand the different industries who are your customers.

365. There is no easy answer?

(*Mr Pateman*) No easy answer, no.

366. As soon as you have selected and trained this genius a head hunter comes along and pinches him for somebody else!

(*Mr Pateman*) That is right.

Chairman

367. You mention the increasing importance of closer co-operation between the main manufacturer and the supplier of parts and components. Do you think that is making a big difference or do you see it as something that still needs great improvement?

(*Mr Ruffles*) I think it has improved substantially in the last five years. Talking particularly of the materials supply industry, of which I have some knowledge, in the early 1980s a lot of the materials supply industry in this country reached a very low ebb with very small R&D teams. Some companies went to the wall. In the others that survived we now see the R&D teams building up. Rolls Royce being one are now taking a much more strategic view and developing longer term relationships with their suppliers both in terms of risk sharing on new programmes and also in terms of the co-generation of technology.

368. Your company is very good at this?

(*Mr Ruffles*) I think it is happening in other companies as well—it is certainly happening throughout the aerospace sector. I am less able to talk about the other sectors.

(*Mr Pateman*) There are problems on the electronic side certainly with the availability of semiconductor materials. The United States really has a stranglehold on that business. There are instances where developments have taken place in the United States and components have become available as a result of it which are not readily available in this country. Because of activities like COCOM, for example, the United States can hide behind the security barrier.

369. If one leaves aside COCOM, is there anything more we can do to get rid of that obstacle?

(*Mr Pateman*) To some extent of course the problem will ease because of the improving international situation and the lowering of the United States requirements in terms of export of materials. The only thing that can be done is to encourage further semiconductor alignments in Europe so that there should be a more substantial semiconductor business in Europe.

370. Is there anything that the Government could do in that way or do you regard that as an interference by Government that is to be deplored?

(*Mr Pateman*) To some extent if Government is to assist it has to interfere; that must surely be the case. What Government could do is encourage still further the establishment within Europe—not within the United Kingdom—of substantial semiconductor companies and components. The components industry by and large (I am talking about electronic components) in Europe is not a very good one.

Lord Kearton

371. But the investment already made by semiconductor companies has been enormous and really they have lost out because of the competition by Japan. If I may go back a little further, I was up at Teesside about a fortnight ago and went round all the major companies in that area. Some of them are very successful. They varied from ICI to a big polymer company making PVC which is now owned by the Norwegians. They have just put in a £50



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million extension. The way that was customer oriented was very impressive. PVC was invented in the late 1930s and is still growing. One gets the impression that on the old established things like ICI's ethylene plant they are up at the forefront, but where they have lost out is in things like consumer electronics and so forth, information technology and all the newer things. Some of the older base things have done extremely well and are still doing well. Aviation is a typical exception because, if I may say so, it is a very expensive thing for anyone to get into. The Japanese are trying to, but obviously it involves investment in buildings so they are trying to do it in association with your good selves and with the Americans. It comes back all the time to the fact that we have been too slow off our feet, taking too long from getting the idea to achieving a stable product. This is partly because we have not discovered what the consumer wants and we have been much too slow in getting from the idea to the product. Now is that a culture thing or what has made that happen?

(*Mr Pateman*) You mentioned consumer electronics. It is true that this country is not strong in consumer electronics although in fact much of the basic innovation was done in this country. What we seem to have missed out on here is the production technology. Our production processes have been too expensive in the past to enable us to compete.

Chairman

372. Would that apply to VCRs?

(*Mr Pateman*) I think it is true to say that most VCRs are imported from Japan.

373. Is that largely a question of production engineering? The technology was not very new?

(*Mr Pateman*) The technology was old. The Japanese undoubtedly made that innovation and I think they were the first to recognise that there was a market place there.

374. That was a market problem?

(*Mr Pateman*) That is my belief. At that time this country was not particularly strong even in basic television manufacture.

Lord Kearton] Quite a few years ago when talking to a GEC representative we tackled him on what GEC was doing in some of these new areas. His reply was, would they not be silly to spend a lot of speculative money on the sort of things you are talking about when we have these very safe government contracts on which one absolutely knows one can make a profit.

Lord Taylor of Gryfe

375. On the same point in regard to paragraph 16 of your summary—"Monopolistic customers who have dictated too much to manufacturers in the past have frequently stifled innovation"—I would like to ask Mr Pateman this. A monopolistic customer is obviously British Telecom. Is that born out in cases where large government or private

monopolies are stifling innovation? I thought there was joint investment as between British Telecom and yourselves in the development of the telephone system?

(*Mr Pateman*) I am not an expert on telephone exchanges, but I think it is true in my experience where you have a monopoly customer who requires equipment designed specifically to his requirements that product is unlikely to find a world market. If one wishes to go back into another field, aircraft, the VC10 was an aircraft designed specifically to BOAC's requirements and there was not a good market for it.

376. I think that is a very good point. How do you solve that, by having joint development with your customer, joint investment in innovation?

(*Mr Pateman*) You have to understand what the world requirements are for a product. You have to organise your R&D and development activities with a view to meeting in due course the world requirement rather than seeking to have an intimate relationship with one particular customer, who may well lead you up the wrong path.

377. That is very true in aircraft.

(*Mr Ruffles*) I think that the particular comment in the report related to the power generation industry. I think that is where industry had a very cosy relationship with the CEGB, the CEGB actually doing a lot of the development of the product as distinct from being the intelligent customer.

378. It is very important because we are talking big industry now.

(*Mr Ruffles*) It is not unlike the relationship between British Aerospace and British Airways in the 1960s which led to the Trident, which was too small for the market, and the VC10, which was too late for the existing market. It is very important that the world market is considered when the costs of the innovation are looked at, and the strategy set up to make sure that the market, or a reasonable share of it, is realised.

Lord Clitheroe

379. Could you develop a theory from this in a sense that a problem with these parts of industry has been too much government interference and protection going back a long time. This has in fact weakened the industry because industry has been able to tick along without competition. Could you at least contemplate an argument that what has happened over the last ten years to a lot of industry has jerked it out of that culture? Can you envisage the possibility that what we are trying to do in industry is innovate management and culture and this is more important than innovating equipment, machinery and processes? That is the priority?

(*Mr Pateman*) The innovation of management culture is certainly very important, and I would not disagree with that for one moment. Many things

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have happened in the last ten years, of course, not least of which is the coming availability of the European common market. In terms of innovation that itself is very important in my judgment. If you are going to indulge in the luxury of innovation you are taking risks, some of which inevitably will fail. You must therefore have a sufficiently large market place available for those which succeed because they will have to pay for the ones that fail. The existence of the common market is an important factor in all this because it has extended our horizons. I also believe that as a culture we have become far more accustomed to the idea of rushing off to foreign countries and selling in those countries than we were 20 years ago.

*Chairman*

380. Mr Neale, would you like to comment on that?

(*Mr Neale*) Thank you, my Lord Chairman. My background is much more concerned with contact with smaller companies so I am listening to the large ones with interest. I spend a great deal of my time helping smaller companies with product development problems. The main incentive there for development is an understanding of the limitations of the current products and of competitors' products. It is very much a technically driven issue. The deficiencies tend to be more in a lack of understanding of product technology rather than in aspects such as finance and marketing. Most of the driving force comes from a recognition of a technical opportunity; you say, is there a market for this, and if there is you say, let us go for it. The next stage is to see whether you can put the cash together to make it all work. It definitely starts at the technical end. The companies that seem not to get there are those which do not have an understanding of their product technology at the top. I speak here of small and medium sized companies rather than large ones.

381. Using the technical advance to get ahead of the competition?

(*Mr Neale*) Yes, that is right. It is the recognition that that mechanism is there and understanding at the top of the company of the technology. I do not suggest that we need all engineers on the board, but the problem with many of these companies is that there are not enough of them to provide the product.

*Lord Taylor of Gryfe*

382. How big is "small"? You keep talking about being involved with small companies, and the reference in the document is to innovation coming from small companies. How big is small, this seedbed for innovation?

(*Mr Neale*) I would say small is less than 200 employees.

*Lord Kearton*

383. How do these small companies hear of you and your services?

(*Mr Neale*) That is a very good question! It is through bodies like the Design Council and the DTI, otherwise, the fact that we have been doing it for 30 years and some of them have heard of us before.

*Lord Erroll of Hale*

384. At paragraph 5.5 you suggest possible ways of improving the UK situation and changing the climate. I wonder whether these are any more than very much on the margin. You say, "Allow dividends to be tax-free up to a level related to a function of the expenditure": do you think that really would push along the innovative field, or requiring "a majority of 60 per cent before a hostile takeover bid can be effective"? These are interesting points, but do you think they do very much more than chipping away at the edges of the problem?

(*Mr Osolo*) I think they are marginal. As I said at the beginning, these were views expressed by Fellows and so were included, but I do not think that is as important as some of the issues about which we have been talking.

385. Do you think the Queen's award for industry for technological innovation has very much more than a fringe effect or is it quite important, particularly for the smaller companies?

(*Mr Osolo*) There is reference to that somewhere in the document in a slightly different context. The Japanese make use of that list: they are knocking on the doors immediately, literally within seven days, of all the people who have won awards for technology.

386. That is an unexpected effect!

(*Mr Osola*) Yes, it is, but they certainly are valuable and they do cause people to think about their technology. They are in fact quite hard to win.

(*Mr Neale*) In small companies too anything you can do to emphasise the product technology is important. An award is one thing. One of the merits of some kind of tax-related adjustment to encourage putting effort into technology is that it makes boards more aware of the value of product technology, particularly if they are accountancy led. If you can put in a financial incentive relating directly to product development it is therefore a good thing. It gets the thinking in the right direction.

*Lord Chorley*

387. Is it practical to define such a thing for tax purposes?

(*Mr Neale*) There are things one can do, such as take money that has been spent on technology development and in some way make it tax allowable. That is one possibility.

388. The whole question of identifying it and not cheating?



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(Mr Neale) That is right.

Chairman] It will have to be identified in the new accounting procedure.

Lord Chorley] That is just R and D.

Chairman] That is part of the innovation process.

Lord Chorley] Yes, but it is the cheapest part.

Chairman] Not the development.

Lord Chorley] The later stage of development is even more expensive than the Frascati definition.

Lord Kearton

389. May I put this to Mr Ruffles. We had some interesting documentation on the development of the RB211. We all know what happened there when it ran into trouble with major reconstruction. There have been all the improvements over the last 25 years which is why Rolls Royce has thrived and become a flourishing company, yet it was an extremely hazardous thing to do to begin with and it almost brought the company down. One recent development was the turbo fan. It seems to have gone out of the news lately—what has happened?

(Mr Ruffles) I think what we are seeing happening is an evolutionary process rather than a step-change in technology. In fact, bypass ratios on our latest engines are creeping upwards slowly as distinct from the step-change projected about four years ago. The same is happening with our competitors as well. What we are seeing here is evolution rather than revolution.

Chairman

390. Is that not the safest way for effective and profit-making innovation, step by step?

(Mr Ruffles) Yes, that is the strategy that the company has tried to follow very much since the early 1970s, but you always have to be aware of the fact that your competitor may not follow that strategy and you suddenly find yourself displaced from the market place.

391. By a big step?

(Mr Ruffles) Yes, so I think we are somewhat relieved at present that everyone is following an evolutionary rather than revolutionary approach.

Lord Kearton

392. But about four years ago this big step seemed to be on the horizon?

(Mr Ruffles) Yes; it still is a threat.

393. The evolutionary equivalent to the RB211 is customer driven largely, is it not?

(Mr Ruffles) Yes, almost entirely. The airlines say to the airframers what they want in a new aeroplane. The airframers try to match that requirement, then we try to match the engine to the airframe. Because the lead time for development of the engine is always longer than that of the aeroplane we are always having to guess the market ahead of launching the engine.

Lord Chorley

394. It has always been my experience that any decisions based on tax are almost always the wrong ones; and it is very often the case that decisions based on grants persuade people to do things in the wrong place or inappropriately and turn out to be a disaster. I wonder whether any of you have any direct experience of what the Australians have been doing with their funding of tremendous tax benefits for research which has wasted an inordinate amount of money in some companies. I speak from a certain knowledge of this.

(Mr Ruffles) I have some knowledge of the situation in Australia. I think the Australian economy—certainly in the case of aerospace—has been very much protected in that every time equipment is sold to Australia there is an offset arrangement with the manufacturer. As a consequence they have not exploited their own technology for world markets to the extent that they can. I know they expect something like a 25 per cent return on investment for any innovation in Australia. We have tried to work with Australia but cannot find products where we can get that level of return to work with them.

Chairman

395. Let us return to the contribution that the Government might be able to make to solving these problems and encouraging innovation and therefore a bigger share of world trade. In paragraph 4.9 you say the requirements boards “had taken the view that innovation would only be supported if it could be demonstrated that successful commercial exploitation was likely”. Does the Fellowship feel that requirements boards did a good job in stimulating and helping more profit-making commercially market-led innovation to take place or is it a good thing that they disappeared?

(Mr Osola) The feeling is that it was a pity that they disappeared. They came into being after the Rothschild Report in about 1972. It took them three or four years to get themselves fully established and equipped and to gain experience. For three or four years until about 1980 there was a successful period when they were working efficiently and the customer-contractor relationship seemed to work very well. They generally took the view that they would only give support to innovative activities where there was a reasonable prospect of commercial exploitation at the end.

396. This was a kind of launching aid?

(Mr Osola) In a sense it was. There was often considerable help available at the pilot plant stage, the initial stages, then less later on. Nevertheless some evidence of likely commercial exploitation was the principle. They were progressively deprived of funds and gradually done away with in the early 1980s. What has been left we feel on the whole has been far less effective.

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*Lord Chorley*

397. Were they composed entirely of industrialists?

(*Mr Osola*) They were a mixture of industrialists, government scientists and a number of observers.

398. Perhaps I may pick up a point in paragraph 4.5 of the evidence where you are rather critical of Government. You refer to their remoteness from the market place and the realities of competitive business. How could something be done about that? Are you saying that requirements boards that are a mixture of industrialists and officials are a solution or do you perhaps have other ideas for a solution?

(*Mr Osola*) I think it was a useful mechanism. In addition I think the transfer between the private sector and the Civil Service—the DTI and the Department of Energy in particular—of senior people is very important.

399. Has that ceased?

(*Mr Osola*) I do not think it has ceased entirely, but it is perhaps less than it used to be. That is a matter of regret. If you second people, attach or employ them, move them from private industry to government, then out of government into private industry, you gradually—as the French are said to do—build up a far better understanding of how industry operates.

*Lord Clitheroe*

400. Have you had the experience of having a senior civil servant on the board of a subsidiary company? They have a great contribution that they can make to the company and vice versa. As long as this does not cross wires and put them into an embarrassing position they are very happy to have this experience. It is something that I strongly support.

(*Mr Osola*) We would certainly support that.

*Lord Chorley*

401. One area we were discussing with the DTI, who gave evidence recently to us, was the LINK programme. This is moving into the area of HEIs and research councils. They said that the take-up had been relatively slow and to a degree they blamed industry on the basis that industry had held back because they were not used to paying 50 per cent of a programme and they thought that if they held out a bit they might get more. That was the sense of what they were saying. What are your observations on the LINK programme.

(*Mr Neale*) I would say it was potentially good. The problem is in getting it moving, defining the subjects and then getting the industrial and the academic members together to work on this. We had a very good activity on a smaller scale with the teaching company scheme run by SERC, which has been excellent. The problem with the LINK programme has been in choosing appropriate

subjects and then getting the thing going. I sense that it is beginning to work quite well; it is just that it takes a long time to get it rolling.

402. It is three, four years old?

(*Mr Neale*) Four.

403. You would wish to see it continued?

(*Mr Neale*) Yes.

*Lord Kearton*

404. If I may come back briefly to the Department of Trade and Industry, we have some evidence from earlier witnesses that the net effect of the Enterprise Initiative has been pretty small. Do you share that view?

(*Mr Osola*) Yes.

405. Equally we had evidence in another paper showing a bias towards what they call LRUs, large regular users, more or less looking at some of the large companies and saying, why should some of the taxpayer's money be going into the larger companies. Is that your experience too?

(*Mr Osola*) I think so. Regarding a lot of the smaller companies who might be expected to benefit from the Enterprise Initiative, frankly I think they have not the time, the energy or the resources to go through the procedure. They would rather take the advice from a consultant and get on with it.

*Lord Taylor of Gryfe*

406. But the consultant is paid for under the enterprise scheme?

(*Mr Osola*) There is a 50 per cent contribution.

407. In the regions it is two thirds.

(*Mr Neale*) There is one big difference in the enterprise scheme compared with some of the earlier ones. In the previous schemes it was the practice to send what you might call a senior expert round to visit the company who would talk to them and assess their problem. That is a very useful input. In many cases—I go back to my original theme—they would define a requirement for technological assistance which had a real impact. If you do not do that the company is inclined to think that what they need is a better sales brochure. That is where most of the funding has gone in the last 18 months rather than in solid technological development.

408. May I ask our consultant witness about the initiation part of Government in paying two thirds if you are in the regions and half in London and the south east of the consultant fee. Is that working? Do you think people value a consultant's advice if they are paying only one third of the cost?

(*Mr Neale*) I do not think they value it on the basis of cost but rather on the basis of how good the advice is and the effect. I am pleased to say I am aware of many cases in which the company decide to keep the consultant on after the original introduction and impact that he has made to help them.



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409. If you were trying to measure the impact of this Enterprise Initiative, would you say this is an area where it has been a success in respect of its effect on industry?

(*Mr Neale*) No. The original scheme in which there was some assistance being given directly to product development was right on target. This enterprise scheme is pretty woolly, it is all airy fairy stuff and in my view it has not been anything like as effective.

Lord Chorley

410. And there is far too much red tape?

(*Mr Osola*) Indeed, my Lord Chairman, and I do not think the regional offices of the DTI have been efficient enough in working with local industry in tailoring their request on the one hand and support on the other hand to precise needs.

Chairman

411. It is a very big subject how much Government can contribute to the solution of these problems. We would all accept that nobody wants Government to go into the business of picking winners. Leaving that aside, however, your view is that Government could do more in the kind of way the requirements board used to help to contribute towards helping to solve this problem, which you would like to see without any undue intervention in picking winners of any kind—a more constructive contribution rather?

(*Mr Osola*) If I may summarise it I would put it like this. (We talked about this before we arrived today). We would like the British Government to take as much intelligent interest in our manufacturing industry as some of our competitor countries enjoy, no more and no less.

412. Can you give an example?

(*Mr Osola*) I think the Japanese are a well known example, and Germany and France to a large extent where there appears to be very good understanding. If we had that level of understanding and commitment, that is all we are asking for.

Lord Chorley] In paragraph 4.4 you refer in the case of Japan to the existence of a national plan setting out policy in key areas. The UK experience in national planning has been a disaster, I think. Maybe we are talking about different sorts of national plan.

Lord Clitheroe

413. Perhaps I may follow up the noble Lord's reference to national plan. The indications I have come across from other areas are that it is not the national plan that counts but the way in which they have managed to get the culture of the importance of industry across in Japan and the intelligence that they provide for industry, not money or the sort of promotion we tend to talk about but really

supportive background on intelligence, which is tremendously important. Would you agree with that?

(*Mr Ruffles*) I agree with everything that the noble Lord has said, and the culture is all important, but nevertheless I think there is still a lot of money in Japan that is going into their industry from Government. Both are needed to keep British industry competitive with the other major industrial nations when one considers the amount of money that goes in in Germany, France, Japan, the United States and recently even Singapore. However, the culture is all important.

Lord Chorley

414. But they are picking winners?

(*Mr Ruffles*) Not necessarily. They are supporting industry that is picking winners.

Chairman

415. Are they not looking to industry to pick the winners?

(*Mr Ruffles*) Yes.

416. And saying that they will help industry to exploit the winners more effectively?

(*Mr Ruffles*) That is exactly the point, yes.

Lord Kearton

417. I visited Japan last year. What we discovered in talking to MITI in depth was that MITI was far less influential than it used to be. They nursed things along; once they got to a certain stage they became self-sufficient and self-generating. When they set new targets, for instance, like the aviation industry, this is where we thought MITI was still doing a strong push. You have just had an association with one of these companies. Are you finding that?

(*Mr Ruffles*) Yes, there is a new initiative in Japan on supersonic transport, a 28 billion yen programme. On this occasion because their domestic industry is still not strong they are inviting 30 per cent foreign participation. We are in discussion with them with a view to participating in the programme. This is part of a national plan for them to work with the rest of the western world to get western technology into Japan and build up their industry.

418. This is my point: it is a plan?

(*Mr Ruffles*) It is a plan, yes. It is funded and it is deliberately structured to draw in European and American industry. There is a plan evolving in materials also for exactly the same reasons.

Lord Chorley

419. You say you do not think much of precompetitive research, if I have understood you aright. Is that not what MITI does a lot of? This is paragraph 4.5 and the beginning of paragraph 4.6, government help for precompetitive development on a consortium basis?

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[Continued

[Lord Chorley Contd]

(*Mr Ruffles*) My Lord Chairman, I think I understand the point of paragraph 4.6, and it is an important one. If you look through the product evolution process the first stage is research, the second stage is some sort of demonstration of that technology in a prototype product and then there is the launch of the product. I think the point being made here is that although the technical risk at the front end in the research phase is high the absolute cost is small. When you get into the later phases the risk remains high but the cost also gets high. In the UK manufacturing industry it is quite often the difficulty of getting through the high risk/high cost phase of the programme that causes problems for industry. There are a lot of schemes available for funding at the research phase but many fewer schemes available for funding during the phase of evolution or innovation when the costs and risks are concurrently high.

Lord Kearton

420. You want more launch aid?

(*Mr Ruffles*) Yes.

Chairman] Let us move on to the financial problem.

Lord Taylor of Gryfe

421. When talking to engineers I find they are inclined to hold the City responsible for their lack of success. You go even further and say there will be a conflict of interest between the City and innovative manufacturing companies. I wonder whether this is so. Here is a cash rich company that does not require to go to the City. Are they better or worse than the people who invest in the pension funds of the company concerned, GEC? Is the conflict of interest evident in the City's support of Glaxo in which they are now reaping the rewards of their earlier research and development? I think the City have been very happy supporting Glaxo. Is your condemnation of the role of the City evident in the experience of 3i? Would not the changes in company law that you suggest in paragraph 5.5 induce a kind of cosiness, a protected environment for the board of directors, when they know that if they just had two or three institutions on their side they would not have a hostile takeover because the 60 per cent you envisage would not be reached? I think you are creating a situation here that is not exactly real. You should look at the City, who are the custodians of the pensions of the employees, in rather a different way. I think you take far too strong a view. I do not know how many of you have gone to the City with bright and innovative ideas and been turned down. Can you respond to that?

(*Mr Osola*) If we gave the impression that we are hostile to the City, my Lord Chairman, or critical of their approach, I am sorry about that; it was not our intention.

422. That is what you said.

(*Mr Osola*) It was not the intention, we got the words slightly wrong. It is inevitable, as you say, that people who are responsible for investing pension scheme funds have to look for safe and high returns whenever they are available. They therefore have to take a view of the investments they make from that standpoint. Industrial innovation, however, is inevitably a long term thing; 10, 15 years may well be the kind of period at which you are looking.

423. Take the City response to the highly speculative investment of the Channel Tunnel, for instance. It does not bear out your condemnation of the City being concerned exclusively with "short termism".

(*Mr Osola*) My Lord Chairman, I do not think that we are involved in condemnation of the City. Their objectives are well understood and so are those of manufacturing industry. The reality is that it takes a long time to carry through innovation, there is high risk associated with it and that cannot be in line with the City investors' objectives. In the Fellowship of Engineering a couple of years ago we invited a number of venture capitalists to come and talk to us one evening about their policies and strategies, indeed, under your chairmanship, my Lord Chairman. We were astounded when one of these capital providers said, "I look for a return of 60 per cent per annum before I will offer support".

424. It must have been a very high-risk proposition.

(*Mr Osola*) Everybody was very surprised to hear this. He said the reason was quite simple: "One third of the ventures we support fail". He said that another third are what they would describe as the living dead, they neither die nor succeed, and the final third has to pay for the first two thirds, hence the very high return for which he looks.

Lord Chorley

425. There is a paradox here in a way, is there not? On the one hand they look for very high returns from British companies, yet the same institutions are prepared to invest in the Tokyo stock market—or were a few months ago—at yields that can only be described as totally derisory, and we pile money into the Tokyo stock market. The only explanation I can think—I suppose I am here being the devil's advocate—that the UK is much good at innovation but they are prepared to trust the Japanese to get it right and therefore in a sense to take a long-term view in the case of Japan but not in the case of the UK?

(*Mr Osola*) Another example was the great difficulty that Pilkington had in convincing the City that the BTR bid was not a good idea, but they won in the end.

Lord Taylor of Gryfe] But they did win and convinced the City that it was better to hold on to Pilkington. This is what I am talking about.

Chairman] The fact is that if Pilkington had been bid for two years before they would not have been



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[Continued

[Lord Chorley *Contd*]

able to say, "We are going to make more profits next year because of the development work we have done" because it was three years away.

*Lord Chorley*

426. What about the reaction to my paradox?

(*Mr Osola*) I wonder whether I may just make one more comment about 3i, my Lord Chairman. If we did not say so in the report we should have done: they have been quite exceptional in taking long views in supporting innovative companies and they have been an example to many other merchant banks in using "patient" money and being truly patient, taking a very long view.

Lord Taylor of Gryfe] But they are financed by the banks; it is an instrument of the City.

Chairman] It is an instrument of investment, not of the City only—3i is financed world-wide. There are two facets of this problem of financing. There is new money, the venture capital money, which is what 3i specialises in; and there is the money invested in the Tokyo stock exchange and other stock exchanges which is not new money but simply buying shares in existing companies which you will have faith in or not have faith in depending on the analysis you have made. Then there is the disincentive to spend money on research and development which is written off in the profits in the year it is incurred, which depresses the earnings per share, depresses the share price, makes the company susceptible to takeover bids and therefore is a disincentive to investment. There are different points.

Lord Chorley] I assume that the Japanese write everything off as they go along.

Chairman] But they have a very different view of "patient" money.

Lord Chorley] Yes, but apparently the City is prepared to accept the view in Tokyo but not—well, let me give an example. A few years ago Glaxo announced a big increase in its R&D programme and its shares promptly went down. If Glaxo had been called Nippon-Flaxo the price of the shares would probably have gone up.

Lord Taylor of Gryfe] The City stayed with Glaxo and is now reaping the rewards.

*Chairman*

427. Can you comment on the different situation in Germany where there are virtually no opposed takeover bids? Where there are mergers they are agreed between companies for the benefit both companies recognise. Here there is the opposed takeover against the wishes of management of the company because they have what we described earlier as spent money.

(*Mr Neale*) I suggest this is because there is more bank ownership of companies in Germany. They are taking a longer term view. The essential problem is the difference between the minimum five year time-scale to develop a new technology and the one year return looked for in the City of London. Those

two things are not compatible. One has all the things you mentioned, my Lord Chairman, the fact that having spent the money and dropped your share value that is the moment they will come in and take you over. You have got to have a stock market system geared to taking a long term view. This indeed is what the Japanese do. It is quite safe to go and spend your money in the Japanese stock exchange. It is not going to collapse—well, sorry! It will not collapse individually, I should say, because the individual company is spending a lot of money on R&D.

Lord Taylor of Gryfe] But companies are not vulnerable because they have spent money on R&D. Some are vulnerable because of inadequate management and the danger of a takeover bid is a stimulus in many cases. Therefore, for you to erect a 60 per cent majority voting and limit the shareholding voting power can be a protective barrier to inefficient management who wish to hold on to the situation. I think you are generalising on this problem. I do not defend the City but I believe in this area the City is becoming a kind of victim of frustrated engineers.

*Chairman*

428. I think that we shall have to discuss this among ourselves. It is the view of the Fellowship, which is what we are seeking—whether we agree with it or not is another matter—that there is a problem of "patient" money that affects incentives to innovation and increased output? Is that a fair summary?

(*Mr Osola*) Yes.

*Lord Kearton*

429. Perhaps we may go to the common market, at paragraphs 8.4 and 8.5. It says, "If the Single Market is a success". Why if? Arising out of that, there are still opponents in this House to the idea of the common market. One reason they give is that the manufacturing deficit with Germany is enormous, and rising. Do you see any prospect of that being reversed? The fact is that we have lost out in our manufacturing exchange with Germany quite dramatically.

(*Mr Osola*) I do not think there is likely to be a short term change in that situation. I think an even more dramatic failure is the staggering balance of payments deficit we have with Finland.

430. Yes, but in absolute terms it is not so much. We do buy a lot of timber from them and so on.

(*Mr Osola*) Many other things they are selling to Britain we formerly sold to them—it is astonishing. The problem I think is that our manufacturing base has shrunk to a dangerously small size.

431. When we were in Japan we saw the shipbuilding people. They had a tremendous boom in the 1970s, then came the Korean competition and it more or less halved it. We found they had had a

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planned reduction which they had used to modernise the yards still more. They said they could not understand what we were doing in this country to let shipbuilding go down because, they said, sure as eggs are eggs it will revive. Last year it was already showing signs of revival. Is this a question again of taking too short term a view?

(*Mr Pateman*) Is it not also a question of the relative importance that the country places on research and development and the relative unimportance it places on production technology?

Chairman] You clearly believe the lack of expertise of production engineering is a very important factor.

*Lord Kearton*

432. The Japanese said they had learnt all their marine engineering from us in Britain whether to make large diesels, ship hulls or anything else, and Newcastle upon Tyne they said is where most of their senior engineers came from. They are producing 500 marine engineers a year very largely on what they have learnt from us yet, they said, we are letting ourselves drop to 20, 25 marine engineers a year and in their view in no way would we ever be able to regain our position because we will have lost all the traditional expertise that we had. The answer to future success can surely never be to give up an industry which at the end of the day may just be going through a cyclical downturn?

(*Mr Neale*) It is the lack of value placed on product technology.

Lord Erroll of Hale] There is not all that much product innovation in shipbuilding.

Lord Clitheroe] Does this not come back again and again, my Lord Chairman, to the culture. The Japanese have come in and because they are sufficiently different they have been able to introduce a new culture into an industrial climate which had been for many years in a mess as a result of what amounted to an industrial civil war. They have shown it can be done with great success. We should be grateful to them and not wondering if their investments are good news or bad news.

*Lord Kearton*

433. Following up Mr Osola's earlier reply about not reversing our trade gap with Germany in the near future, what does he feel are the prospects for our exporting industries in the 1990s? Do you take a cheerful view, balanced optimism, balanced pessimism or what?

(*Mr Osola*) I think there are a number of optimistic signs. The companies that have survived the setbacks of the last ten years are addressing the problems in a very businesslike way. We have listed in the document a number of the things that have happened which we have not necessarily discussed today. Many of the surviving companies are addressing themselves very seriously to Europe, language training is going on, people are establishing footholds in Europe and so on. There is a lot more

attention being paid to Europe than in earlier years when we tended to look to the old Commonwealth and the United States for our exports. On the other hand one has to face the reality that our manufacturing base is very small in relation to what the country needs to generate by manufacturing. To rebuild that and provide skills at professional and other levels will take a very long time to do.

434. Will it happen through a specific strategy or just through market forces?

(*Mr Pateman*) I do not think it will happen through market forces alone. One big problem at present is the availability of skilled manpower. This is one of the main reasons that we cannot expand as fast as we would like to.

*Chairman*

435. Do you think that is a major obstacle to expansion?

(*Mr Pateman*) There is no question of that.

*Lord Kearton*

436. At what level?

(*Mr Pateman*) At all levels.

(*Mr Osola*) It is a very regrettable fact that industry after all these years is still not spending enough on training at all levels.

*Chairman*

437. I think that point is being looked at by other bodies.

(*Mr Pateman*) This is where some form of national plan would be important, my Lord Chairman. One of the key features is that the engineering and manufacturing industry does not look attractive to people coming out of school for a variety of reasons and somehow or other one has to make it look attractive. It is not just a matter of paying them more money.

438. A very interesting study was done by a small company, of which I am chairman, looked at from the students' point of view. Do you believe that that is relevant?

(*Mr Pateman*) Very much so, yes.

439. To get back into some of the industries we have lost out on to some extent you can help recovery by taking licences and getting the product technology. Unless you have a firm production engineering base, however, you will not make any progress in a competitive market. You put a great deal of importance on production engineering improvement. What can be done in that field? It has been at the bottom of the pile for a long time in prestige.

(*Mr Osola*) We would like to see a greater emphasis placed on the education of production engineers, manufacturing engineers, call it what you will. In discussing this very problem before we



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[Continued

[Chairman Contd]

arrived today, we were unable to find any school in the country that is training engineers in electronics manufacturing technology, systems engineering manufacturing. That is a frightening situation in 1990.

(Mr Pateman) That is a cause for very great concern. We have great difficulty in recruiting people from university or anywhere else who are even interested in the problems of looking at manufacturing processes.

Lord Kearton

440. Could you not sponsor more university chairs?

(Mr Osola) We do sponsor a number.

441. I know that you do—we once questioned GEC on this. We understand that the interest by British industry in the university system is pretty low. It is a new idea for industry to take more responsibility for sponsoring technological subjects at university.

(Mr Pateman) To some extent that is true. I think also the universities are finding difficulty in getting people to join these courses.

Lord Taylor of Gryfe] Changing the climate begins before you hit the universities.

Chairman

442. If we had a government representative here today they would say, yes, that is true. We are doing a great deal more with TECS and the like. Are you satisfied that, although we got behind, everything possible is now being done to deal with this education and training problem?

(Mr Pateman) More is being done now certainly than in the past. Much more needs to be done.

443. In what sort of way?

(Mr Osola) A good example is the modular schemes which are in force at Warwick, for example, and one or two other places. Many companies are sending young engineers, not only graduates, but senior technical level engineers, to Warwick University for modular training related to work on which they are engaged in their own companies. That is valuable and could well be taken up elsewhere. The courses can be spread over two years or more. Companies like Rover, Rolls-Royce, GEC and a number of others are making use of that. I commend that to you, my Lord Chairman, as a model that we would like to see expanded very much elsewhere. It is efficient.

Lord Kearton] I can confirm that. I think Warwick is an outstanding success. However, it is one major centre and we need half a dozen similar centres. Industry has supported Warwick very substantially—the new £10 billion extension comes very largely from industry. For our future needs, however, should one not be seeking out other centres?

Chairman

444. You would like to see that multiplied by ten?

(Mr Osola) Absolutely. Just to give you the scale of it, Warwick are getting £17 million a year put in by industry.

Lord Kearton

445. Is anything in hand to repeat the Warwick success elsewhere? To a certain extent Warwick generated its own success?

(Mr Osola) Loughborough of course are looking very hard at the whole area of design, which is a key part of this innovative exercise. There is a Fellowship of Engineering chair at Loughborough. In addition to that the Fellowship of Engineering have sponsored nine visiting professorships in the last 12 months at British universities. It is having a considerable impact in the universities. One would like to do more, but the funds are not yet available.

(Mr Neale) One key problem is still a cultural one, in connection with what Lord Clitheroe was saying. The difficulty is that production engineering lacks glamour and so does manufacturing industry. We have really got to do something on a much more national scale to make people realise that manufacture is vitally important, terribly interesting and awfully creative. If we can do that, we will get the schoolboys wanting to get into it and we will get all the professors and everything will start to happen.

446. At a seminar a few weeks ago we were told about a scheme by which you have a whole series of Fellows going to schools, and you want every school in the country to be visited regularly by Fellows. Nobody has mentioned that this morning. Why is that?

(Mr Osola) In fact it is not the Fellowship of Engineering which is doing that; I think it is the Engineering Council.

Chairman

447. You welcome that?

(Mr Osola) Most certainly.

(Mr Pateman) With one proviso, my Lord Chairman. If you are to influence the schools you need to be sending young people along to talk to them, and the majority of Fellows, I regret to say, are too old to meet that requirement!

448. And would you agree they have to be properly trained or one can do more harm than good?

(Mr Pateman) Oh, quite.

449. Can we go briefly to the defence R and D budget. Are there any lessons to be learnt from the United States Government in the way that they seem to make better use of their expenditure and resources devoted to defence R and D than we do? Are there

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any obstacles that you would like to see removed or incentives given to make better use of the large sum that we spend, particularly compared with Japan, which has virtually none?

(Mr Ruffles) I think one has to be very careful about looking at the United States. One factor is the amount of money they put into R and D in defence, which is a very large sum of money. If you pour money into any industry then you are bound to get a high degree of success. I do not think historically that their R and D has been particularly well targeted, but the situation is however changing. They have looked at what is happening in Europe and as a consequence their own R and D is now being better targeted. I think that actually represents a threat to Europe and to the UK so some caution has to be exercised. That said, there are some characteristics about the way they handle their R and D that are important. What I would draw most attention to is the fact that as well as investing in the product they also invest very heavily in the manufacturing process. They support innovation in machine tools, the introduction of automation into the factories of American industry and the upgrading of those processes on the basis that that will lead to reduced costs of their own procurement programme. Those benefits of course immediately spin off into the rest of their industry. I think that is a very important lesson to come out of the United States because it has a double gearing. If our Ministry of Defence were investing in the process rather than or as well as the product, they would get a double benefit. The company can then free up the money that it invests in the process and start investing in the product. The company is then taking the risk on the product and the defence sector is taking the risk on the process, which is a much lower risk with a much more certain return provided that it is invested properly. If I looked at any aspect of US R and D that is the one I would single out for copying, in the UK.

450. Long years ago in the 1950s and 1960s the British Government used to do just that, provide the most sophisticated and up to date machine tools and equipment to make the products that they wanted.

(Mr Ruffles) And, indeed, with the change in the defence procurement pattern as a result of conventional force reductions, lead time in the defence sector—from order to vehicles being available—will become increasingly important. Investing in the process therefore becomes important as a defence subject in its own right.

Lord Taylor of Gryfe] That is a very useful statement.

Chairman

451. If I may come back just once more to Japan, they have an industrial development bank. Have any of you come across that at all in respect of the contribution that it makes to encouraging the kind of thing we have been talking about?

(Mr Ruffles) No.

Lord Kearton

452. The Germans have a development bank too which makes money available at low rates of interest to newly emerging companies. In paragraph 10.3 there is a throwaway remark about investment in newly emerging countries, "some companies are already transferring software development to India and the newly emerging independent nations in Eastern Europe may well be attractive for research and development work over the next few years". Can you expand on that?

(Mr Pateman) There is a very great shortage of software engineers in this country and there is a surplus of them in India. The tendency therefore is to subcontract work into India in software in order to get the job done.

453. This sounds as though it is an isolated occurrence; you do not see it as a general trend?

(Mr Pateman) It will become more and more general if we do not find ways of encouraging more software engineers.

Lord Chorley

454. They are quite competent?

(Mr Pateman) Oh, yes, they are very competent.

(Mr Ruffles) I think it will be a general trend because it is very practical for these countries to do it. They cannot invest in a lot of capital equipment, but they can very easily pick up software development. I happen to know that the same thing is happening in Poland already. It was quoted to me—I am not sure whether this is correct—that one can hire a graduate in Poland for eighty dollars a month.

Chairman

455. Rolls Royce will be transferring there, will it!

(Mr Ruffles) I heard that from another company. We have not followed it up!

Chairman] We have kept you a long time. We are most grateful to you. We thank you again for your helpful memorandum.









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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 25 April 1990

**COOPERS & LYBRAND DELOITTE**  
*Mr Patrick McHugh*

**CAMBRIDGE INSTRUMENTS**  
*Mr Ian Cruttwell*

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WEDNESDAY 25 APRIL 1990

Present:

Butterworth, L	Erroll of Hale, E
Caldecote, V (Chairman)	Flowers, L
Chapple, L	Gregson, L
Chorley, L	Kearton, L
Clitheroe, L	

**Memorandum by Patrick McHugh, Coopers and Lybrand Deloitte****BRIEF SUMMARY OF MAIN POINTS**

In our evidence we review the significance of current investment growth rates in manufacturing for the UK and reveal that a doubling to 30 per cent is necessary to balance the current trade account.

We believe that share valuation by earnings growth is a poor measure of corporate performance and we argue for new accounting standards which will allow capitalisation of investments in innovation.

We discuss the shortcomings of government and EC support for innovation and suggest the adoption of a more interventionist approach along the lines of Japan's MITI.

Finally we suggest a nationwide campaign promoting the worth and excitement of a career in the innovation functions to attract new, high quality staff into manufacturing industry.

Coopers & Lybrand Deloitte have examined the terms of reference of the Sub-Committee I—Innovation in Manufacturing Industry. Our evidence relating to the obstacles to innovation and to the conditions which stimulate it are set out under three general headings:

- *Economic Significance of Manufacturing Investment;*
- *Sources and stimulus for new knowledge and techniques;*
- *Resources, skills and experience necessary for application.*

*Economic Significance*

1. There is no doubt that manufacturing is a significant factor in the UK Economy. What is rarely appreciated is how truly significant is the rate of growth of investment in Manufacturing.

2. The current account balance shows that the UK has entered a downswing on its payments cycle and even with North Sea Oil production at near its peak, a forecast deficit of some £12 billion shows the significant decline of the manufacturing sector. Despite a 1989 investment growth rate in Manufacturing Investment of 15 per cent placing the UK near the top of the European growth league table, the sector is unable to respond to the rising demand in the economy.

3. Despite the fact that we are now at the peak of the business cycle, the growth rate of Manufacturing Sector output has yet to return to its 3 per cent pre 1973 level and was only 0.1 per cent between 1979 and 1987.

4. The April 1989 Staniland Hall report shows a 5.1 per cent annual increase in expenditure on plant, machinery and manufacturing production assets for 1981 to 1986, and forecasts only a 5.9 per cent growth for 1986 to 1991.

5. UK investment in tangible fixed assets and intangible assets by manufacturing industry according to the DTI Business Monitor is £7 billion per annum.

6. This level of investment will never be sufficient to close the trade gap. On the basis of some simple assumptions of business profitability, one can calculate that an immediate doubling of the investment, or a doubling of the growth rate for some four years, is necessary to close the current account gap. Such changes are unlikely to take place without significant structural changes in the economy.

7. Despite the dawning realisation of these economic factors amongst businessmen, the City, academics and government, none has responsibility for taking action. Many managements fail to appreciate that strategic investment decisions must achieve a specific balance between market forces and financial constraints. Companies have to balance long term market requirements with short term profitability. In recent years, many have failed to achieve this balance. It is not surprising that British Industry is the animal it is. In a 1989 survey conducted by Professor Doyle of the Warwick Business School, 93 per cent of the respondents rated return on investment as strong, but only 25 per cent were represented in markets expected to grow!

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8. It is unlikely that the situation with regard to investment will change. Sales and Profit growth in major UK manufacturers such as Rolls Royce, BAe and the Rover Group have lagged behind the economy in general and they have not enjoyed the profit growth of other sectors. The net rate of return to fixed capital in 1986 was only 10 per cent in Manufacturing Industry. New process technology such as MAP (Manufacturing Automan Protocol) which we helped DTI to promote at CIMAP in 1986 is unlikely to stimulate investment with returns at this low level. Innovation in supply and industrial organisation, such as Toyota's Just-in-Time Manufacturing System which led to a doubling or even tripling of productivity, is far more significant. It is important, however, not to underestimate the impact of new product technology on manufacturing industry as it can create and simultaneously eliminate whole markets.

9. It is the City's attitude of short termism which most significantly affects investment in innovation. This short termism is exemplified by a focus on growth of earnings per share as a key measure of corporate performance. This leads to an understatement of corporate value as only short term earnings are taken into account.

10. The focus on growth of earnings per share means that significant investment which, under current accounting principles, would be written off against profit in the period in which it is incurred will tend either to be spread over a longer period, or not to be undertaken at all. Furthermore in periods of economic downturn, when profits are low, investment in innovation may be viewed as disactionary and consequently cut back.

11. Accounting principles have been revised over the years to enable companies to capitalise product design and development expenditure and to amortise these costs against future earnings (SSAP13 revised). However, this can only be done when future earnings can reliably be ascertained. This, therefore, excludes most innovatory activity. Moreover, once written off, such expenditure cannot be reinstated as an asset even if the earnings stream can, at a future date, be substantiated.

12. The valuation of shares based on short term earnings is now widely agreed to lead to an undervaluation of a company. Most notably, the historic cost conventions and conservative approaches have meant that the inherent value of innovations built up organically have not been recognised. Many companies are now in this situation.

13. In contrast with the UK, Japanese companies trade on significantly higher price/earnings ratios in Tokyo. A much longer term view must thus be taken of the underlying technological value of a company by the Japanese market. The danger for UK companies is that they will fall victim to predatory acquisition of their technologies by competitors before the value of these technologies is recognised in market values.

14. The logical counter to this danger is for UK accounting principles to recognise the value of investment in innovation in corporate balance sheets in a similar way to that being proposed for brands. This would require a recognition of the value of technology built up both in hardware and in the expertise of engineers and scientists. It would also require new methods to trace the use of technological assets so as to be able to match them against future earnings. Finally, greater emphasis would need to be paid to the explanation of innovatory activities and their likely future payoffs in corporate commentaries to shareholders.

#### *Sources of New Knowledge and Techniques*

15. We believe that innovations in supply and industrial organisations are most likely to lead to significant changes in manufacturing industry. However, the supply of technology into new products is also critical for long term survival. In this area, the Government and the EC have supported innovation.

16. Our observations of programmes such as ESPRIT, EUREKA and Alvey show that far from providing "pump priming" for innovation they are over bureaucratic, long winded and more likely to appeal to intellectual curiosity than commercial hardheadedness. These programmes are based on a principle of pre-competitive research, whereby companies combine to undertake research into an area hoping for some innovative outcome they can each exploit. Thus, logically the most commercially attractive ideas do not enter and companies participate in the programmes with the knowledge that any outcome is unlikely to be significant. The programmes simply provide some extra funding for dubious projects and help companies keep in touch with the academic world. The very nature of these programmes is such that as any research comes near to exploitation by manufacturing industry, the sponsoring body will cease to support it.

17. We consider DTI's insistence on weighting their support towards SME's (Small and Medium Enterprises) to be dogmatic rather than pragmatic. It is true that SME's suffer economic inequalities of scale; however to our knowledge it has not been shown that they are any more effective innovators than large concerns. Intuitively, the reverse may be the case since large firms will increase their existing research and development activities with extra funds with far greater ease than SME's which have to make relatively much more significant investments.



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18. In general it is the "even handed" principle which guides the activities of Government departments in promoting and supporting innovation. Thus, the preference for pre-competitive research and SME's and the lack of interest in large concerns and demonstrator projects. It seems to us that nations can catch up and that governments can legitimately intervene to make it happen. The Japanese MITI has recognised this for a long time as their vice-minister Naohima Amayo said:

"Businessmen are risk averse. Therefore, if the invisible hand cannot drive the enterprise to invest, the visible hand must".

#### *Resources and Skills*

19. We are convinced that despite the urgent need to increase the level of innovation in Manufacturing Industry little can be done without experienced people to apply the new technologies and techniques. We believe that the nation has a serious shortage of "Architects for the modern kind of manufacturing". Whilst there is some evidence of this cadre being created (e.g., Dr John Parnaby's Manufacturing Systems Engineers in the Lucas Group) we are concerned that such initiatives are not more widespread.

20. Our concern is not for the status of Engineers, more than enough has been done in this area by Sir Monty Finniston and the Engineering Council, we are more concerned by the barriers to merger being raised by some of the Engineering Institutions. Their sometimes public bickering will generate adverse publicity for a profession whose most respected exponent, I.K. Brunel, did not call himself an Engineer at all but a Natural Philosopher. We should widely promote the qualities of innovation to the public at large and in this way increase the number of high quality people entering Manufacturing Industry.

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[Continued

*Examination of Witness*

MR PATRICK McHUGH, Director of Engineering, Coopers and Lybrand Deloitte, called in and examined.

*Chairman*

456. Mr McHugh, thank you for coming and for your memorandum. Is there anything that you would like to add to it?

(Mr McHugh) Thank you, my Lord Chairman. Perhaps I may introduce myself and the position from which I might be able to talk to you and provide some evidence. As you know, I am a director of Coopers and Lybrand Deloitte. This will be the new name of the merged firms of on the one hand Coopers and Lybrand, and on the other Deloitte, Haskin and Sells, from 29 April. We are perhaps best known as a financial partnership that conducts audits, carries out insolvency business and helps people with their tax. We are also a large management consulting business and from the date of the merger we will have some 1,600 professional staff in our consulting business. It is from the management consulting perspective that I address you today. Perhaps I should further emphasise that I am not an accountant but an engineer and come from that background.

457. We were very impressed by your memorandum. Can we assume that although no doubt you produced it, it represents broadly the views of your firm?

(Mr McHugh) I have discussed it with a number of our partners. Some of the views we have held in public bodies such as the accounting standards bodies where we play a significant part and we have also presented in public and through the press these views. We give them to our clients, so broadly you could assume that the memorandum represents the views of our firm although there will be some personal interpretation, I am sure, overlaying it due to my own experiences.

*Lord Chorley*

458. I suppose that I should start by recording a semi-financial interest since I ceased to be a partner on the accounting side of Coopers and Lybrand as it then was last September. It would be helpful to learn something about the activities of Coopers and Lybrand Deloitte and how you encourage innovation, which will give us some sort of background as to how Coopers are involved in this area?

(Mr McHugh) Perhaps I may answer in two parts. I should first make some comments about how in a financial sense we directly support innovation in certain ways; and secondly say how we work in the field of innovation as part of our normal on-going business. Let me take the first point. As a firm we actively support the London Business School High Tech. Unit with funds. This is a unit aimed at helping the small and medium sized enterprise in the field of high technology, particularly in relation to business strategy, and has conducted a number of studies in this field. This we sponsor as a gift. We also helped Professor Kumar Bhattacharyya at

Warwick University set up a Centre for Manufacturing Renewal, because we felt it was important to support the Midlands in industrial renovation. We also support some Science Parks. I am responsible for an office on the Warwick Science Park, in which we locate the Technology Group of Coopers Deloitte because we attach great importance to being close to such centres of learning. In addition we support various conferences and seminars. As several noble Lords know whom I have met at the Foundation for Science and Technology, we are an associate member and recently supported a most interesting evening on managing technology and the problems and difficulties associated with that. As a final example we mounted a conference in conjunction with The Times newspaper on "business and the environment" to which the Minister of the Environment came and talked on how his new policies and the White Paper would affect business and of the consequent need for innovation.

*Chairman*

459. In addition to those admirable activities would you broadly say that in your own consulting and accounting work you encourage firms to be innovative and invest in innovation when appropriate?

(Mr McHugh) A theme of my evidence—this is something that we will perhaps come back to again and again—is that I believe that innovation takes place on three fronts. The first is in *products*, finding new products by research and bringing them through to the market. Second and Third and perhaps even more importantly for manufacturing industry as I understand it in the terms of this Committee, my Lord Chairman, it is about *organisation and supply*. It is about the way manufacturing business can operate in a different form, thereby creating more wealth and bring it through to the nation and to the shareholders. It is in these two secondary areas that perhaps our most important contribution takes place. We have worked recently with Nokia in Sweden. Here two firms merged and there was an urgent need to sort out the joint organisations of two research and development groups; to bring these together more efficiently to work on product development. We are currently working with a British firm, which your Lordships probably know well, called Crosfield Electronics, it produces electronic scanning equipment for the press and pre-press industries. We are helping them to change their organisation so as to reduce dramatically the product development lead time. Thus our work is not in the technologies that they use but more in how and in what ways they can change their industrial organisation to improve.

460. To make it more likely that the investment will be effective and profitable and therefore to encourage further investment?

(Mr McHugh) Exactly. There has been a certain amount of research conducted recently showing that



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MR PATRICK MCHUGH

[Continued

[Chairman Contd]

manufacturing industry increasingly will compete by speed of delivery and speed of development rather than by specific technologies or availability of products in the market.

461. And in your experience one of the characteristics of the successful firm is that they have that right?

(Mr McHugh) I think there have been some very good examples such as AT&T in the United States and Hewlett Packard have introduced these kinds of approach. If I may cite the Japanese, a good example is the Honda NSX, which has just been brought to market in three years from the initiation of the new car programme. They had a prototype in operation some 18 months after the beginning of the design programme. In comparison to the design cycles we have in the British motor industry, albeit that we have improved in recent years, this is a quite devastating performance. On a competitive basis I suspect it would provide for any motor company a very firm, competitive position.

Lord Chorley

462. It may be a bit unfair to press you to generalise, but how typical is that of British industry? Are we lagging behind this speeding up the whole product cycle in America, Japan and maybe Germany? If so, what do we do about it?

(Mr McHugh) My belief is that we are lagging behind. Some excellent research was conducted by Professor Kasra Ferdows from INSEAD, which I understand he repeats biannually with colleagues from Japan and the United States. He looks at the characteristics of manufacturing industry in these three economic spheres. There is no doubt if you look back over his last three surveys that Europe notably has taken a different stance from Japan and the United States, which concentrate far more on flexibility in design and manufacturing—the organisational perspectives—while the Europeans focus far more on cost in the manufacturing cycle and cost reduction. I therefore believe there is some good evidence that points to differences.

Lord Kearton

463. You referred to 1,600 people on the consultancy side. Is that all in the United Kingdom or world-wide?

(Mr McHugh) Just in the United Kingdom.

464. I was interested by the amount of sponsorship. You mentioned Warwick University and seminar sponsorship. What proportion of your total turnover do you spend on that kind of thing?

(Mr McHugh) I am afraid that I do not have that figure in my mind, my Lord Chairman.

465. You do it from the point of view of bringing more profit, public relations, the good of the country or what?

(Mr McHugh) Here you ask me to make a general statement about our business. We believe that we

should offer a broad service capability to our clients. If I may digress slightly, I think it would be true to say that in the near future in terms of professional advisory firms there will be only two types, the very large firms which offer a wide breadth of services right across the field, and the very small firms that operate in a niche. I think our business strategy is clearly to be a broad service firm.

466. Do your clients come to you saying they want some consultancy or does your financial side say, so-and-so firm should be geed up a bit and had better get hold of consultants?

(Mr McHugh) In the long-term we tend to work across all the services that we have. The initial contacts tend to be on a point by point basis. Someone will come to us looking for audit advice or consulting advice. In the longer term we tend to work across those boundaries.

Lord Taylor of Gryfe

467. The DTI enterprise initiative, which pays half your fees in London and two thirds of your fees if you are in the region, is a considerable assistance to you in attracting new work. If someone is going to pick up two thirds of a very expensive Coopers and Lybrand bill it looks like a very good bargain, and he may get a good deal as a result.

(Mr McHugh) I think I need to answer this in two parts. First, we were involved in setting up the enterprise initiative scheme. We earned fees from doing this work. However, it is not true to say that the scheme provides a considerable income to the firm today. Bluntly, the reason is that the fees available under the scheme are not sufficient to cover our costs as we operate as consultants.

468. Does it encourage people to go to you?

(Mr McHugh) It encourages people to enquire and indeed to use consultants in the round, but it would not be true to say that it forms a significant part of our business.

469. In paragraph 9 of your evidence you come back to this well-worn theme, "It is the City's attitude of short termism which most significantly affects investment in innovation". I attended a very interesting seminar last night at the Foundation for Science and Technology. I asked one of the speakers whether finance was the major constraint on this development. He answered with the very good example of an innovation in which Sheffield University had taken an equity stake—very successful. He said, what we are short of in this country is not finance but ideas. He was speaking from his own experience. Can you give some examples of cases in which the City's short-termism has inhibited any recommended scheme or progress that you have made to any client?

(Mr McHugh) I will try to answer your question with the precision that it demands. I too was at the seminar last night at which you spoke, and I was most interested by your question and, indeed, nearly leapt to my feet to reply.



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MR PATRICK MCHUGH

[Continued

[Lord Taylor of Gryfe Contd]

470. This is the opportunity now!

(*Mr McHugh*) Before I come to the specific, I think it is important in thinking about the City not to think of it as one unique body. Indeed, last night we heard much from the venture capitalists whom I view as being on one extreme of the way that innovation is supported, the venture capitalists being particularly appropriate for very small firms or for individuals who seek to bring a particular invention to the market. They take a long-term view by nature, but also they are prepared to take and to carry very high risks, hence when things are successful they look for a high return. I do not believe therefore that the venture capital element of the City can be particularly subject to the criticism of short termism. I think there is much confusion. Frequently we hear the phrase, there is no shortage of funds in the City. That is true: there is no shortage of funds ready for the right, bright technical idea. That is where the venture capitalists play an important and vital part, I believe, in the innovation cycle. There is however another part to the City typified perhaps by the pension institutions and large fund managers. There you find very much an attitude of looking for share growth or share performance as a unique figure and in this way businesses are actually evaluated. In this case I think it is accurate to say that businessmen will not take an investment decision because they will consider its direct impact on their share value. Share value hence affects the way that they react. To answer the question therefore you need to look at companies who are typically large at the moment in that they have some significant shareholding and are perhaps looking to make some large investment in process or new product development. Then you have to look for examples where progress has been halted. Having made that general statement, which in my experience is correct, I am afraid I cannot immediately think of a specific example that would answer the point.

Lord Clitheroe

471. Assuming that there is this problem with institutional investors do you have ideas of how this can be changed? If so, would you like to expand upon it?

(*Mr McHugh*) I believe that there is one important way in which the attitude may be altered. I tried to point to this in paragraphs 10 to 13. What I think could be done quickly is to make a change in the accounting standards. There is currently an accounting standard, SSAP13, which allows businesses to capitalise a small amount of their investment in research and development once the particular technology is nearly realisable in the market. I think we could be far more radical and create a change in this accounting standard that would enable far more of the investment to be capitalised, thereby changing the way in which institutional investors will look at the balance sheet of a business and force manufacturing businesses to be far more open in their disclosure to shareholders

of the way that they are spending money. I understand that this is a risky suggestion, but I think sometimes one has to do things in a risky way.

Chairman

472. Does this not mean you are capitalising an aspect that may have no value because you cannot be certain that the development will be successful?

(*Mr McHugh*) My Lord Chairman, that is exactly the risk to which I refer. I think we have two excellent examples in our economy of extremes that we have seen. The one would be the Rolls-Royce case some years ago where indeed there was a great deal of expenditure capitalised, which caused a significant problem later on. The other extreme would be the BTR and Pilkington situation where Pilkington had been investing very heavily in research and development and, indeed, bringing new products through to the market place, but because they were unable to capitalise that expenditure they became a takeover target for BTR. I think we would not wish to have either of those situations.

473. Would it not be a good halfway house to allow capitalisation of investment in R and D which has a potential successful outcome in profitable sales but to make provision against it in the profit and loss account on the other side of the balance sheet so it would reduce profits for the time being but leave the asset on the balance sheet and you could then adjust the provisions as you got near to marketing the product? I understood that this was being considered by the accounting standards committee, is that right?

(*Mr McHugh*) Yes, it is being considered by the accounting standards committee. Roger Munson, one of our partners, has been active in bringing this forward. I think it is a good halfway house and goes some way towards it, but it does not fundamentally overcome the problem of having to assess the value of technology which is not yet on the market. Indeed, one needs to ask some fairly careful questions about how able an accountant or auditor—albeit maybe technically qualified, which perhaps should be a requirement—is to judge the worth of the technology.

474. The Japanese put the emphasis the other way round. It is normal in Japan to spread the cost over three years. Only in exceptional circumstances do they write it off in the year in which the expense occurs.

(*Mr McHugh*) I think that is an approach, but I believe we need to be somewhat more forceful in the way we push people to think and explain their technical and technological investments and that the route of capitalising that expenditure would force firms to be far clearer in the way they explain.

475. It works very well in Japan. The Japanese are really leading this field anyway. Does it not behove us to take this and look at it carefully?

(*Mr McHugh*) I believe that there are many things that we can emulate in Japan.



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MR PATRICK MCHUGH

[Continued

*Lord Butterworth*

476. That brings us back to your example of Honda again. I wonder whether you could tell us in greater detail and explain how the management differed compared to any British manufacturer bringing a new car into production. Can you describe to us the way in which Honda bring the car to production and the way in which an average British car manufacturer would bring a car to production? What are the major managerial differences?

(*Mr McHugh*) I can probably explain them to you albeit at a somewhat superficial level because in fact there are some fairly complex techniques that differ in the ways we engineer products in our two countries. I base my experience on having visited Japan on two occasions and looked at certain aspects of Japanese industry. At the highest level the characteristic of the process in this country is rather like a relay race in which the baton of specification is passed from the marketer to the specifier through the process of design and then into detailed component drafting, jig and tool drafting and then into the manufacturing process. At each step, as I say, it is rather like a relay race in which a baton is passed on as documents and specifications. The Japanese approach is perhaps rather more like a rugby match in which the team of people are advancing together towards the end goal and the ball is passed to the most appropriate player at the most appropriate time. The way they do this is through the use of a number of techniques that come under three major categories. First, they focus strongly on the end customer and the end customer's requirements. A great deal of work has been done in the American Supplies Institute on techniques such as quality function deployment, which enable one to take the rather loose requirements of an end customer and convert those with some rigour into the technical goals that you might wish to achieve in design. Secondly they design for robustness. In our design processes we tend to create a system which might be an automobile and we then put tolerances on to the various parts in that system and look to machine and assemble the parts in the plant. The Japanese approach tends to be driven more by parameters and the variability that you might find in these parameters. You design round the end performance that you want coming backwards to the tolerances which just fall out once you have determined your parameters. In other words, it is turning the process somewhat on its head. The third and final category is that they tend to organise themselves into cross-functional teams. You do not find in a Japanese company the rigid function boundaries that we have round us all the time in British industry. For them, an engineer is an engineer; he is not a component engineer or a production engineer. He is someone who works across the whole area of applying innovation. I suspect that this is the real cause that underlies their success and ability to reduce so dramatically their lead times.

*Chairman*

477. Would the same apply between engineering and marketing as well as between the different specialisations that you mentioned?

(*Mr McHugh*) Yes.

*Lord Chapple*

478. Is that what we need to copy?

(*Mr McHugh*) I believe in respect of our engineers we should copy some of it, yes.

*Lord Butterworth*

479. If you look at Jaguar, say, whatever they are doing, they seem to have the idea of a new car and they start with a very modest investment and gradually build up so that the prototype emerges quite late on whereas the Japanese throw an enormous investment in to begin with, having had preliminary planning, and they get the prototype out very much earlier than we would. Consequently they get the bugs out of their thing before the selling day whereas the British car manufacturing seem to be getting the bugs out after they have got it on the market. Would that be a fair description?

(*Mr McHugh*) My Lord Chairman, that is very accurate. If I may, I should like to give a very specific example from some research we did of two manufacturers of small ship dredgers, one a British company and the other their main Japanese rival. We looked at the amount of time they were spending in the various parts of the innovation process. In this case of course it is designing a one off ship for a specific dredging task. In overall terms we found the Japanese took one half the man hours that the British firm did to design a competitive dredger. What was even more startling was the break up of those hours into the various phases of the design project. The Japanese firm took in total some 30,000 hours. The breakdown was 20,000 hours in getting the specification right, 7,000 hours in detailed design and 3,000 hours in redesign as the order was finally placed and brought through into manufacture. The British company had twice the number of total hours, 60,000, but the breakdown was only 10,000 getting the specification right, 20,000 in the basic design and a further 30,000 in redesign once the order was placed. It is this balance that is the key to getting the thing right.

*Lord Taylor of Gryfe*

480. Who got the order?

(*Mr McHugh*) The Japanese firm.

*Lord Clitheroe*

481. In a nutshell, may I ask whether the Japanese approach is customer driven and our approach tends to be invention driven: is that a fair way of putting it? Unless you have the customer telling you what he needs and you follow that and serve him by providing him with what he wants, you double the amount of time needed.

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MR PATRICK MCHUGH

[Continued]

[Lord Clitheroe *Contd*]

(*Mr McHugh*) As to this case shipbuilding is a very good example. Every ship is different. Unless you understand exactly the specification at the end of the day and design it as a whole, you will end up with a massive redesign phase. We see this in our shipbuilding today where the different groups design different parts of the ship and it is not uncommon to have to cut holes in the bulkhead of a ship which is nearing completion to fit the pipework through. Some firms in the UK such as Vickers shipbuilding have gone a long way to try to remove this problem and now use computer aided design systems to help them—the phrase they use is “the sub on the tube”—design a complete infrastructure of a vessel before they come to manufacture it. The balance I was talking about of understanding the customer is certainly a key to the way that modern design should be done.

Lord Gregson

482. When the Committee visited Japan some time ago some of the people we talked to there told us that their system was to allocate all staff to the product. They no longer worked for Sony but for the product—Walkman and so forth—so the whole team was located in one location, production engineers, design engineers, accountants, everything. Until they came out at the end of it with a product, that was their life's work. Is that the situation?

(*Mr McHugh*) That is exactly what I was describing. I think it is rather frightening when you see this kind of dedication and drive going on and they can do things so much quicker than we can.

Lord Chorley

483. Does this suggest a rather less hierarchical and by the same token non-functional structure in a company's organisation? Would that be your experience?

(*Mr McHugh*) I believe that one characteristic of successfully innovative firms is a flatter structure although it would be wrong to say in Japan there is not a very strong hierarchy in the sense of leadership and superior/junior. That is implicit in Japanese society.

Lord Butterworth

484. What sort of initiatives would you like to see to create a cadre of people able to foster innovation in manufacturing? Listening to you today, I wonder whether your answer to that question would be to say, destroy all the institutes of engineering and start all over again.

(*Mr McHugh*) Perhaps I could answer that in a more general way. What I think we could do is boost the importance and role of the Engineering Council. I think the Engineering Council is an excellent body that is set up with exactly the right principles but it somehow does not seem to have taken and grasped that role. Maybe therefore I would not get rid of the

engineering institutions; instead I would push for a great deal of strengthening of the Engineering Council.

Chairman

485. What more would you like to see them doing?

(*Mr McHugh*) Specifically to influence the Institutions to merge with the greatest possible speed and the least possible public outcry at doing so. As engineers and professionals I think we should be able to rise above the squabbling going on at present.

Lord Gregson

486. Statutory powers have been recommended to enable them to do this. The Government balked. Would you say there is any other way of doing it than by statutory powers? The present evidence is the opposite.

(*Mr McHugh*) I agree. It appears that is what is happening at the moment. People will be unable to agree when they quibble over the mere name of a combined body. The Engineering Council is in place and it could be much more powerful at pushing us forward as a nation.

487. Without statutory powers?

(*Mr McHugh*) I suspect we will need some to make it happen.

Chairman

488. You gave those man hour figures, which were very interesting, with much greater emphasis by the Japanese at the beginning of the project to get the specification right. Is that not very much part of the ethos of the Japanese as a whole quite apart from innovation? In industrial relations they spend hours and hours and hours, and then they go flat out. We tend to take a much shorter time and say, “You, you and you, and that's what we're going to do”. It is the same with making a contract: you spend a long, long time but when you have it you go much faster?

(*Mr McHugh*) My Lord Chairman, I can give you a very specific example of this from my own experience. As a young engineer I worked in and ran a press shop, part of the Hawker Siddeley group. I decided to try to copy the Japanese quick setting presses which at the time were getting a great deal of publicity. They were stating that they could change automotive presses in about ten minutes; we took some two and a half hours at the time. That was the occasion of my first visit to Japan. The company I visited took two and a half weeks to take me around their customers and the factories where they made the presses and to talk to me endlessly, in teams, about exactly what I wanted as a press for my factory. I went at the same time—like all good company policies ours was that we had to get three quotations—to two British companies. Both took under two hours to understand, or try to understand, the specification I was seeking. I believe that this answers your question.



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MR PATRICK MCHUGH

[Continued

*Lord Taylor of Gryfe*

489. Your paragraph 16, on the European Community, is pretty strong stuff. If this is your experience I think we can pretty well write off the EC intervention support: "Our observations of programmes such as ESPRIT, EUREKA and Alvey show that far from providing 'pump priming' for innovation they are over bureaucratic, long winded and more likely to appeal to intellectual curiosity than commercial hardheadedness." I must compliment you on your drafting—that is formidable! If this is so, it is very important. I wondered whether you wanted to be even more rude!

(*Mr McHugh*) I made this observation from personal experience, having been involved in these various programmes. I believe there are areas where these programmes have been important in bringing fundamental research specifically from university bodies into commercial reality. My criticism is focused on the way that these programmes do not adequately support existing businesses and particularly large businesses to undertake innovation. In this I believe that they have been particularly ineffectual because they force unnecessary co-operations between businesses and other bodies and demand a degree of disclosure which any business seriously wishing to compete would not wish to make in the first place. They also demand excess bureaucracy in reporting, obtaining grants in the first place and satisfying grant conditions, that they hinder any team that is trying to move rapidly. Let me give an example. I worked on part of a EUREKA programme on a FAMOS project. FAMOS is the part of EUREKA designed to look at automated assembly in factories. We ended up trying to comply with the EUREKA terms by building a six-body team across three different nations and trying to agree what kind of programme we would undertake to introduce flexible automation into the factory. Needless to say, we were unable to do this. The sheer management and meeting time that it involved were inappropriate. The business that was to be the main recipient of this development eventually decided they would drop it and carry out the development with their own funds and just one supplier. The ESPRIT programme in its early days came from the perspective of wanting to build transEuropean structures, for example, for information technology in computer integrated manufacturing. It launched projects to define things called system architectures for people to build computer systems in the future. They did this seemingly in complete isolation from the major computer manufacturers, who already had in place these architectures or were developing them commercially at great speed. I cannot understand how the programme could have been accurately focused and could have produced so many reams of carefully considered documentation when the commercial world was already undertaking this research.

*Lord Chorley*

490. One hears and reads that MITI in Japan is very good at organising its governmental research effort through precompetitive research and all the evidence is that they are successful. It may be that we are looking at apples and oranges and how they look at precompetitive research is really rather different from the way we are doing it. Is there a difference between what MITI means by precompetitive research and what the DTI does?

(*Mr McHugh*) Yes, I believe there is a significant difference between the MITI approach and the DTI's definition. Indeed, more than that, there is a difference between DTI's definition and the way precompetitive research is interpreted within the European Community.

*Chairman*

491. Can you explain?

(*Mr McHugh*) If you enter a precompetitive research programme with a European partner you will find before you get even to begin discussing the programme that they are asking you to sign agreements about intellectual property rights. This does not happen in the UK programmes. They have a much closer commercial view of precompetitive research than DTI does.

492. This is MITI, is it?

(*Mr McHugh*) This is in Europe. In Japan MITI operates again with a different view of research, the major thrust being to guide government and semi-government bodies to purchase Japanese equipment in the areas they have chosen to target so that the precompetitive research that they do is combined with purchasing policies that drive that from being precompetitive into almost dedicated markets.

*Lord Chorley*

493. Is it also that DTI has tended to think in terms of markets or sectors whereas MITI has tended to think in terms of technologies? If you are thinking in terms of markets there is likely to be a situation where almost by definition it is difficult to get a precompetitive situation, but if you are thinking in terms of technologies it may be different?

(*Mr McHugh*) Yes, that is my experience. They chose specific technologies, a real example being large scale silicon devices, and they said: we are going to support research into this area. They did not pick winners, to use the jargon phrase, in terms of the specific technology projects. They said: this area is an area in which we will support studies to invent, then to innovate. They then placed restrictive purchasing policies onto their governmental and semi-governmental bodies to purchase only Japanese large scale semi-conductor devices. This created a monopoly for that item of technology because it came right from the research institutes through to the end products that were going into large scale manufacturing.

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MR PATRICK MCHUGH

[Continued

*Lord Gregson*

494. Have you seen the trade figures this morning?

(*Mr McHugh*) I have.

495. Recognising that 90 per cent odd of that is manufactured goods, we have a fairly urgent problem on our hands. The present policy of HMG and to some extent of the Commission, though not quite the same, is not to fund near market research and development. Is this sensible in view of the position we are in? Are we not desperately in need of near market product development?

(*Mr McHugh*) I believe we are in need of near market investment. I make a quote from the Japanese MITI in my paper of Naohima Amayo, who is their vice minister. May I repeat it because I think it supports this point very clearly. He said, "Businessmen are risk averse. Therefore, if the invisible hand cannot drive the enterprise to invest, the visible hand must".

Lord Chapple] Reading the whole of this page I found it difficult to see what it was you were actually arguing for. You say in paragraph 16, for example, "The programmes simply provide some extra funding for dubious projects and help companies keep in touch". What you are saying is that the way money is being spent not only does it not help but it is counter-productive, it seems to me. You then quote Naohima Amayo in the way you have just done suggesting that the visible hand—presumably the Government—should be doing it. They will do the same thing again surely; all they will do is put more money in.

*Lord Gregson*

496. Is not the difference between precompetitive research and near market research in that case?

(*Mr McHugh*) There are two points here that need to be considered carefully. First, is the investment that is going in at present appropriate for creating innovation? Secondly, at what place in the innovation cycle should that investment be made? That, as the noble Lord said, is closer to the point of realisation of innovation than it is at present. I am sorry if I confused the noble Lord, but I was trying to make two quite distinct points.

*Chairman*

497. You will be aware of the process in the aerospace industry of launching aid?

(*Mr McHugh*) Not fully.

498. Help is given by the government in launching a product right through to the market. Is that the kind of thing you would like to see more generally applied from what you were saying just now about beyond precompetitive research into the development phase?

(*Mr McHugh*) Yes, I would, although I would focus it more on technologies than on specific

projects. I believe that we ought to support demonstrator projects, something at present not supported by DTI.

499. Near market technologies rather than near market product development?

(*Mr McHugh*) Yes.

*Lord Gregson*

500. But can you really separate the two?

(*Mr McHugh*) No, you cannot.

*Chairman*

501. In general therefore you believe that in order to close the gap you mentioned at the very beginning we need substantially more investment and, that in line with your Japanese quotation, the Government need to give a bigger hand to get back to where we should be if we are going to get there in reasonable time?

(*Mr McHugh*) That is the essence of the argument. I think it is also true that the problem of innovation has very long and deep-seated roots, far beyond the current trade position we have seen the figures of today. If we believe the only way we can balance our trade is through manufacturing, then the only way we can do it is by increasing the level of innovation and return that is there in manufacturing industry. I see no other way forward.

*Lord Gregson*

502. You agreed to what the Chairman said, but he missed out the near marketing bit. It is no good putting the money in too far in advance and not doing the rest of it, is it?

(*Mr McHugh*) I believe there are two points, first, does one believe the only way of closing the trade gap is through investment in manufacturing; two, what would be the most appropriate way of doing that. We have talked already about how I believe that should be done.

*Chairman*

503. On your first point, would you like to see greater tax incentives to invest in capital equipment, process equipment, to make our manufacturing more competitive and more cost effective?

(*Mr McHugh*) I am not certain whether that is the answer. I believe as we talked earlier that the idea of capitalising innovatory activities and expenditure would be far more effective at raising that particular issue than tax advantages.

504. You mentioned that small and medium firms found greater difficulty; then by implication you said government were unwise to concentrate so much money on small firms. If they find it difficult is it not more sensible to put more effort into helping them?

(*Mr McHugh*) May I separate the two arguments, which may have become confused in what I was



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MR PATRICK McHUGH

[Continued

[Chairman *Contd*]

saying. The first argument says that the Government is focusing its investment on SMEs. It does that because it seems to be a belief that SMEs will provide a greater boost to us nationally by growing quicker. That is where I make my comments about being dogmatic rather than pragmatic. I have seen no evidence, and would love somebody to show me, that SMEs are more cost effective at innovation than are larger companies. I think there is possibly therefore a misconception. The second point I make is that a large company, because it already has the infrastructure and procedures for research and development, can incrementally by the use of a grant do more with greater ease than a small enterprise. If we think of the nation as a whole therefore it may well be wiser to encourage investment in larger firms because pound for pound we would get a better return.

*Lord Taylor of Gryfe*

505. You refer to acquired technology by licensing in which we avoid the large and speculative investment in R and D on our own books. Do you have any experience of the impact of licensing arrangements on major companies, particularly in the engineering industry?

(*Mr McHugh*) I am not sure of anything I could add at this point that would be relevant.

Lord Taylor of Gryfe] It is the foundation of Japan's success, as Lord Kearton says. They have acquired the technology without spending large sums on research.

Lord Kearton] I am left with the impression that Mr McHugh is pretty pessimistic really.

Chairman] In what respect?

*Lord Kearton*

507. He does not think the right policies are being adopted at the moment, he seems to suggest a change of policy, he seems to suggest a change of accountancy. Let us assume nothing much happens, what is going to happen to the industrial base of the country?

(*Mr McHugh*) I am afraid that the noble Lord is probably correct. I think we have seen a fairly slow and inexorable slide of the manufacturing base. I am pessimistic for the future.

506. You said you were part of an organisation of 1,600 consultants. You must have more hands on experience than most people in this country, yet your considered view is to be pretty pessimistic?

(*Mr McHugh*) For the UK I am afraid it is pessimistic. I work in Europe extensively. I came back yesterday from France where I am working with a French defence contractor. In the last year I have worked in most of the European countries. I think we are afraid to open our eyes to what is really happening.

*Chairman*

508. May we come to your last paragraph, the final sentence, "We should widely promote the qualities of innovation to the public at large and in this way increase the number of high quality people entering manufacturing industry". Do you have any idea as to how that might be done? Would you agree that this is behind a lot of our problems that we are discussing?

(*Mr McHugh*) Some of my earlier comments about the Engineering Council and the importance of that in engineers' lives needs to be taken into account. We also need to begin with the schools. Some excellent initiatives have been undertaken recently to try to bring engineers into schools. I remember being with the noble Lord Lord Kearton in a discussion at the Foundation where this was raised and talked about. I think however we need to go further with this. We have a good example in Dr John Parnaby at Lucas who created a group of what he calls manufacturing systems engineers, who it is true are something of an elite but who bring the new ways of manufacturing through to the Group companies in the way that they perform. In this I think we have some model of the way we can do it.

*Lord Chorley*

509. Is there anything wrong with being an elite? You said it with a slight apologetic note in your voice!

(*Mr McHugh*) I did not mean to! Engineers must perhaps think of themselves as being an elite.

510. Is that not one of the problems, that engineers are not recognised sufficiently by the general public as elite?

(*Mr McHugh*) I believe that your Lordship is right. Look what happened when vets appeared on television with James Herriott. Lord Swann told me last night that when he was chancellor of Edinburgh University following the James Herriott programmes the applications for vets increased enormously and have remained high.

*Lord Chapple*

511. Given that we have a plethora of consultants as well as the London and Manchester Business Schools, which have been around for some time, what have they not done that they might have done that would have altered the situation we are in? Be self-critical here. We—those of us who have been in industry in some way or other—all share in the burden. We are all partly responsible for where we are now.

(*Mr McHugh*) If you ask me to be self-critical, my Lord Chairman, I would say that one of the things we have done is to take some of the brightest people out of the line management in industry into our consulting business. I hope we can bring more back by doing that than we removed, but I am conscious of that being one way in which we have affected manufacturing companies. We have also perhaps

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MR PATRICK MCHUGH

[Continued

[Lord Chapple *Contd*]

placed too much emphasis on strategy and strategic thinking and not enough on the very real problems of day to day organisation within businesses. Being self-critical I think we have taken too highbrow an approach to some of the problems that exist in our manufacturing companies. It would have been better to get our hands dirtier in the day to day operations of business than perhaps we have in the past.

*Chairman*

512. Do you think the business schools could have done more and could now do more to put more emphasis on what we have been talking about rather than what you describe as strategic aspects?

(*Mr McHugh*) Business schools tend to concentrate on business strategy and the financial aspects of that and the marketing aspects. I would be thrilled when more of the business schools begin to teach technology management, innovation management and how to conduct technical audits and technical forecasts.

513. Would Cranfield Business School be an example of where that is starting to be done?

(*Mr McHugh*) Cranfield has made some excellent beginnings. In respect of the IM Institute, which is on the Cranfield park, I believe some of its activities are quite significant, but it is not widespread and it is not a common approach.

*Lord Kearton*

514. Have you seen any of the John Harvey-Jones programmes?

(*Mr McHugh*) I am afraid I was travelling in Europe.

Lord Kearton] There have been five now and they strike me as something the business schools should take on board. What they point to in every single case is the management.

*Lord Butterworth*

515. May we just think about the London Business School, which was intended to be the prototype. Could you imagine a more unsuitable place for putting it than the middle of Regent's Park as far away from any engineering department as one could possibly get it? The assumption behind it was, if you train these chaps they are just as good in commerce as they are in manufacturing industry. What you need is the most intimate relationship between your business schools and your engineers, do you not?

(*Mr McHugh*) I believe that is absolutely right. Look at the Hanover Institute, the Hanover Fair and the infrastructure that there is in Germany and the connection between them all— *there* is an example of where to place a business school, in the middle of a technological revolution! I can only agree.

Chairman] It has been a most constructive afternoon. We are very grateful to you for giving us the benefit of your wide experience.



*25 April 1990]**[Continued]*

### Memorandum by Cambridge Instruments

#### BACKGROUND

Cambridge instruments is a medium size company (turnover £130M pa.) operating world wide with headquarters in Cambridge. Our products are developed and manufactured at four factories world wide. Each factory (in Vienna, Heidelberg, Cambridge and Buffalo) is responsible for its own marketing, design and manufacture for a range of products. Where possible these product ranges do not overlap. The products are sold world wide through a series of selling companies organised on a territorial basis. Each selling company is responsible for all products. Our products are scientific instruments ranging from Electron Beam Lithography systems selling for £1.5M to simple stereo microscopes at £500. The company invests approximately 7 per cent of turnover into R&D (i.e. £9M) of which 70 per cent goes into new product development. Overall the company is profitable but the profit margins, although comparable with similar businesses, are low. The low profit level stem from the low gross margins in this business which in turn stem from the high level of competition.

#### DETERMINATION OF THE OVERALL LEVEL OF R&D

The level of internal funding for R&D is primarily set by the senior management each year in the budget setting exercise. This is primarily a "top down" exercise with the level being what is left after the estimates of the sales (income) and other costs (principally manufacturing costs). The R&D competes with, for example, advertising expenditure and, like advertising, is treated as an expense. The primary aim at this phase is to ensure a level of profit that is consistent with both our abilities and the stock market expectations.

The factory managers are primarily responsible to ensure that they have an adequate R&D investment and are expected to ensure that their products (treated as a business and picking up their share of the selling costs) are profitable. However whereas we always budget to provide an overall profit the individual factories may, under special circumstances, budget for their product area to make an overall loss. This may happen due to the need to make a large readjustment in their operation (expanding or contracting) or if the factory manager judges that a large investment is required in new product development to improve his position.

Although there is always pressure to reduce costs the marketing and R&D departments generally have a large file of desirable projects (often described as essential) and thus provide an upward pressure on the expense. If the business projects a large increase in profits then the upper limit on the R&D expenditure is normally one of indigestion. The factory is unlikely to be able to expand its R&D by more than say 20 per cent (see below) and this provides a brake on the growth even when the growth is expected to be sustained.

Finally the corporate staff monitor the level of R&D expenditure to ensure that the level is sufficient and that the funds are being correctly applied. This is the only expenditure that has central control and this reflects the importance of the investment.

#### SOURCE OF FUNDS

The R&D within Cambridge Instruments is almost entirely funded by the use of retained profits. Last year the total externally funded R&D work was £500K and that was above average. There was virtually no work funded by government. The company's balance sheet is excellent and so it would be possible to raise loans for a new product venture but it is not our policy to do so.

Customer funded development is normally the development of some minor adaptation of an existing standard product. It is our policy to do as little of this work as the market will allow. When it is done the customer is charged a fixed price and we retain all design rights. Occasionally we will undertake the custom design of some special equipment for an important customer. Again this is done on a fixed price basis but the customer retains some control over the intellectual property generated by the contract. We would normally only undertake such work when either we are in a position of decline and need the work to keep a team together or are under pressure from the customer (or both). In both cases the costs of the development work are treated as cost of sales and not as R&D costs.

#### DETERMINATION OF FACTORY R&D LEVEL

The overall factory level of expenditure is determined as above. However during the budget process the factory management will need to determine how to apply their costs and what kind of skills are needed. This is done as an iteration essentially between the marketing department and the R&D department. The R&D department management will make their assessment of their various costs (salary, fringe, occupancy, depreciation, etc.) and of the requirements of the various proposed new product development programmes. The marketing department will determine the likely sales of the product and will thus generate a business plan for the new product. From these the priorities are set.

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In most years well over half of the budgeted effort is assigned to projects that are already under way. However even the established projects are reviewed to ensure that they still justify their priority. This interplay between the marketing and R&D departments is entirely within the factory and has little central direction. However the end result is part of the budget presentation and is reviewed.

#### EFFECTS OF NATIONAL POLICY

The two major obstacles to a high rate of innovation within CI are the high level of infant mortality and the shortage of qualified staff (not only in the engineering skills but also in marketing and production). The high level of mortality means that a large amount of the design work by the engineering and marketing staff is necessarily wasted. This requires a higher level of effort than is normally sustainable. The restriction on the high level of sustained effort is essentially one of cost and consistency. As noted elsewhere our UK operation receives virtually no Government funding and the schemes that there are are directed away from product development. Furthermore the schemes have been continuously changing. By contrast our German (BRD) plant have been receiving funding from the Land for the past decade on the same scheme and explicitly for product development. In addition the overhead rate is set at a realistic level (essentially it is a level set for all contracts and is not subject to negotiation). The combination of CONSISTENT funding together with funding aimed at product development has allowed us to maintain a higher level (+15 per cent) of innovation than otherwise.

The second major restriction is the availability of good staff. Our products are all sold to sophisticated users and most involve a high degree of technical complexity. This means that we need technically competent marketing staff to be able to plan our products and flexible production staff to allow us to introduce new products rapidly. In addition of course we need the engineering staff to develop our products. It is considerably harder to find these staff in the UK and in addition they are often not so appropriately qualified. For example over half (63 per cent) of our development staff are not qualified as engineers but as physicists, mathematicians, chemists although they are mainly employed as engineers. In our German plant there are very few such "wrongly qualified" staff. The raising of the level of VOCATIONAL training is of course an old cry but still true.

#### SUPPLY SIDE DEFICIENCIES

As described separately the company has little difficulty in funding its own work at the current level. If we wished to embark on a specific large new product development we would probably be able to raise the funds. The financial aspects of any "supply side deficiency" are not significant.

#### LOCATION OF DEVELOPMENT

It is the policy of the company to give each factory a range of products which do not overlap (a policy that is currently under strain). These factories have their own marketing (for their products) and their own development. The factories may have feeder or satellite factories in lower cost areas that provide components but these factories do not have any product development responsibilities. It is also our policy that all product development is done at the factory where the product is to be produced. The rationale for this is that we build up a team identification with the product and we are able to respond to any technical problems more rapidly. It follows that the product development takes place at the factory that is responsible for that product range. Although a temporary availability of skills may dictate otherwise this policy has been followed consistently. The location of the product range has been entirely dictated by the historical accident of who was best at what product at the time of their merger/acquisition.

#### EFFECT OF UK GOVERNMENT INDUSTRIAL SUPPORT

At the time that CI were privatised 1980 we were receiving funding under a DTI scheme called "support for innovation". Using this scheme we developed the S150 microscope, the Q900 image analyser and modernised the EBMF series. All of these products had a dramatic impact upon the survival of the company; without these products the company would not have survived. However after the initial surge of work the level of funding dropped off. This was partially due to the "additionality" clauses (we were now profitable) and partially due to changing government attitudes to helping product development as distinct from "pre-competitive research". The current UK Government support has essentially no effect upon our innovative performance whereas the BDR support does have an effect.

#### PATIENT MONEY

Apart from the observation that all money is impatient we have had no problem in acquiring funds for acquisitions or if we wanted for development.



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**IMPACT OF ACQUISITIONS AND MERGERS**

The major effect of the policy of acquisitions has been to strain the management resources. This has made it harder to sustain the level of commitment to further risky projects. However the acquisitions have all been in complementary areas and the overall impact on innovations has been minimal. The recent merger with Wild Leitz is different. Here there is a substantial product overlap and there is no doubt that the large amount of product rationalisation that will be required will reduce the level of product innovation for the next 2-3 years. As it happens the overlaps do not affect the Cambridge plant and so the impact on them will be minimal. It remains to be seen what effect the change of the financial status of the company from a publicly listed company to an unlisted one with a single shareholder having an overwhelming position will ultimately have. The initial indications are that the management and shareholder of the merged company will take a long term view of its investments.

**WHY DOES THE COMPANY NOT PUBLISH THE R&D EXPENDITURE**

Essentially the reason is that it is under no pressure to do so and it publishes very nearly the minimum information that is required. Furthermore there is no widely accepted definition of R&D that would allow easy comparison. Even within the company LEICA there are very wide differences of treatment in what is intended to be a single company. These differences in treatment of such costs as internal license fees, depreciation, factory occupancy charges have caused differences of the order of 40 per cent in our internally reported R&D expenses. There is no doubt however that if it was to our advantage to do so (for example a tax concession on R&D expenditure) then we would do so.

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[Continued

*Examination of Witness*

MR IAN CRUTTWELL, Group Technical Director, Cambridge Instruments Ltd., called in and examined.

*Chairman*

516. Mr Cruttwell, thank you for coming and for your memorandum. Would you like to add to or expand on it?

(Mr Cruttwell) I do not think so, my Lord Chairman. Most of the comments relate to the manufacturing industry entirely. They relate to a company that is engaged purely in marketing, design and manufacture of products so we are not trading anybody else's products to any significant degree. We are also operating with a very high degree of competition in every single one of our product lines internationally, both in where we sell and in where we manufacture so it is a somewhat specific experience. Anything I say is coloured by that experience.

517. What sort of proportion of the innovatory developments you start to produce new products for the market have been successful—it is a third or a tenth or what?

(Mr Cruttwell) Totally new, about one in three to one in four is successful.

518. They would be very successful and make substantial profits?

(Mr Cruttwell) About one in eight is "very successful" of those that are successful and will generate about our average profit, which at the bottom OPP level is somewhere in the region of 6 to 7 per cent so it is not dramatic with gross margins of the order of 30 per cent—again, one of the problems. Those products we would count as successful; "very successful" have to make about twice as much as that.

519. And that pays for the four or five out of ten?

(Mr Cruttwell) Those two pay for the failures, yes.

520. On balance you make a reasonable return?

(Mr Cruttwell) Yes, overall. Obviously it has varied from year to year, but that sort of amount, so yes is the answer.

521. By and large therefore you are successful as an innovatory company. Would you like to see more government help to make you and other companies of your kind even more successful to help our balance of payments?

(Mr Cruttwell) Gosh, you have implied three different assumptions there! First, I am not of the opinion that we are very innovatory. The vast majority of our products is quite mature,

equivalent to a car.<sup>1</sup> What we are doing is adding features. It may be we are very innovative in the features we add, but I would not regard it as continually introducing new products; it is rather continuous improvement and buying the technologies that are available. With regard to government funding, as I have said in the paper, it is essentially irrelevant to us and has been for the last five years primarily because it has not been funding product development and the vast majority of our effort—and, indeed, failures—has been in product development. The funding techniques have not allowed for that; it has been essentially precompetitive. If the funding were to be consistent, that is, the same over a five-year period or thereabouts, it would have an impact, but anything less than that it takes us too long to gear up to the new scene, present our applications, get the thing funded and get the results. I think if it were viewed on a five-year term the answer is yes. Whether it would impact the balance of payments is not at all clear to me. We would increase our exports.

*Lord Gregson*

522. Would you like to do more product development than you are doing?

(Mr Cruttwell) In the long run, yes. I could not however absorb a 50 per cent increase in the amount of product development.

523. Is not a company that depends on mature products vulnerable?

(Mr Cruttwell) Yes.<sup>2</sup>

524. Does that imply therefore that you ought to move out of that situation as quickly as you possibly can?

(Mr Cruttwell) No. The death rate among companies relying on totally new products is far higher. If I take as restricted a region as the overall line of scientific instruments, the death rate is very high. The noble Lord is correct that if I do nothing but live with my present products then I am very vulnerable.

<sup>1</sup>I am using a very high standard for innovation here. I would for example say that there has been no major innovation in the auto car industry for the last 80 years. The major components of the car were defined then. However there have been significant innovations in terms of features such as four wheel drive. In the same way one of our original customers for a scanning electron microscope (a major innovation for which we were responsible) would recognise all the main components of our latest product but he would say that we have been very innovative in the latest features and technologies that we have applied to the basic concept.

<sup>2</sup>There is some confusion here. If a company is in the trade of selling bread then that is a very mature product but they may be very innovative in the way they sell it. In the same manner we have been selling microscopes for over a century and they are thus a very mature product. However the actual production life of any one model of microscope is only 3-7 years.



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MR IAN CRUTTWELL

[Continued

[Lord Gregson Contd]

525. Or just to titivate them?

(Mr Cruttwell) Yes, that is right, if that is all I do I am vulnerable.

526. I am just suggesting you may need to move rather faster?

(Mr Cruttwell) That is certainly true.

Lord Chorley

527. Or that you need a larger more broadly based company so you can have some swings and roundabouts?

(Mr Cruttwell) Over the last decade effectively but somewhat less, eight years, we have expanded primarily so if I looked at what was Cambridge Instruments ten years ago, that is to say, at Cambridge, that has not dramatically grown in turnover but it has slightly shrunk in manpower. The primary strategic goal in increasing our size, as you have said, has been that we have wanted to decrease our vulnerability if one market area turns down or one exchange rate goes adverse so one part of the company can fund another part. That is happening every year.

528. I see from your paper that you have just merged with Leica—because of that sort of consideration?

(Mr Cruttwell) Exactly that, yes.

Chairman

529. You said in answer to Lord Gregson that you would like to do more product development and innovation. What are the main constraints?

(Mr Cruttwell) In the very short term it is people shortage. If I were asked to spend 30, 40 per cent more on product development next year the immediate constraint would be people. The people that would be constraining me would be senior marketing people and senior engineering people. It is not our normal practice to go and spend money at design consultants, but if we do we still have an enormous management task to define to them what it is we want done, which is essentially marketing in engineering, and to monitor the programme, that is the bottle neck in the very short term.

530. Have you started tackling that by recruiting them?

(Mr Cruttwell) Oh, Yes.

531. Or is it the impossibility of recruiting that is your real problem?

(Mr Cruttwell) I was answering your question in two parts. I was telling you what the short term constraint would be. The long term constraint is one of profitability. We are in an industry where our margins—the difference between manufacturing and selling costs—are not very high; they are running typically at 30 per cent and a good product is 40 per cent. Since I have to add on to that the selling costs I end up with not very much money to dispose of in

R&amp;D or in dividends to the shareholders. In fact, the two numbers are often quite comparable. The longer term constraint is one of not very good profitability. In that case, as I said, funding would make an impact. That would be long term, I suppose over a three-year period, the time it would take to recruit and train and bring up to speed the management.

Lord Taylor of Gryfe

532. You must be operating on very tight margins in North America where you have a substantial American shareholding?

(Mr Cruttwell) That is one of the areas we are supporting.

533. Sixteen per cent of the group operating profits—you must have reasonable margins in Europe. Your major shareholders you quote a total of 30, 40 per cent so you have a widely dispersed shareholding?

(Mr Cruttwell) I am not sure of the date of that. It does not sound right.

Lord Kearton

534. This must be before the merger.

(Mr Cruttwell) Yes, I am sorry, you are correct.

Lord Taylor of Gryfe

535. I wondered if you were being inhibited and how you raised more money to finance the kind of expansion by acquisition of R&amp;D under your own steam.

(Mr Cruttwell) The funding of acquisitions which are then viewed as having an asset base, be the asset buildings or a good trading position, is fairly easy. I think we could raise loan money to generate extra investment without any difficulty. The problem is that we would be expected to sustain the profit level. Our products and, indeed, our market places, do not sustain very high profit. I am sorry I misunderstood you earlier. You are correct, the shareholding was very dispersed. Since the merger the net effect has been that a single shareholder, Schmidheiny, owns something of the order of 60, 70 per cent.

Lord Kearton

536. You say merger, but the Leica people have a bigger part? Have they been roughly as profitable or less profitable? I know a few years ago Leica went through a very bad patch.

(Mr Cruttwell) The profits as the Swiss and German accounts are driven are not too bad. Their asset position was appalling. Even allowing that they were operating in Switzerland and Germany their interest payments were very high so their OPP profit levels were very poor. One reason we were able to do a merger with a company that had a turnover approximately three times our own—the merger was a 40/60 per cent one—was because our balance sheet was significantly better: we had about 11 per cent bank loans out of our total shareholder equity.

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MR IAN CRUTTWELL

[Continued]

[Lord Kearton *Contd*]

537. They have great staff availability. Are you feeling that with your superior management the new business will have a different look about it?

(*Mr Cruttwell*) Yes.

538. Based essentially where, here or overseas?

(*Mr Cruttwell*) We have a fairly small corporate management of the order of 30 people from the new company, and that is based in Switzerland.

*Lord Chorley*

539. You said the assets were appalling. By that I assume you mean it was heavily reliant on bank loans?

(*Mr Cruttwell*) Yes.

540. It is frequently said that one of the great strengths of Germany has been bank support. Companies do not have to rely on the stock market, they are not exposed to takeover situations. It is therefore suggested we should have a more German banking style approach to British manufacturing industry and then we would all be much better off. Your experience through your new partners, however, would seem to be the opposite?

(*Mr Cruttwell*) I do not think they got themselves into their bad position purely because of the generosity of the banks. They had a peculiar shareholder structure that had access to quite large amounts of funds because they were very friendly with the bank and were allowed, if you will, to go on far beyond the point at which any UK bank would have screamed and stopped it. One could say that in that sense the German approach hurt them. We have also acquired over the years the Jung operation in Heidelberg, and that was quite the reverse: that had been run quite leanly in terms of capital and work in progress. But, yes, in this particular case the German banking system allowed them to get into a fair mess. That was why they were acquired by Wild.

*Lord Gregson*

541. It is very difficult to generalise on the basis of such anecdotal evidence?

(*Mr Cruttwell*) I was not trying to.

Lord Gregson] No, you were not, but there was a suggestion—

*Lord Erroll of Hale*

542. If things grew rather fat and soft on German bank generosity why were they such a good thing to take over? Surely they need to be made lean like you are already?

(*Mr Cruttwell*) First, I would not blame the German banks. The major reason for having the merger was to try to spread out our base so we would not be vulnerable to one or the other. Where you can merge depends on who is available—perhaps more appropriate, who is available at the price that we can afford—and that was certainly true of our previous acquisitions of stereo microscopes from Bauch & Lomb and Reichert Jung from Warner. They were

both, in a different way, companies that were not doing well. There has to be something wrong for us to be able to afford them!

543. Would you say it was really rather a defensive merger?

(*Mr Cruttwell*) On our part? Yes, to an extent that is true, defensive not in the sense that we were under threat of being purchased but in the sense that we needed to expand our base to defend ourselves in our case against Japanese competition.

544. Has the merger brought in new products or new markets?

(*Mr Cruttwell*) Primarily new products. We were already trading pretty successfully world-wide. The only significant markets we were not penetrating significantly were the COMECON markets; nor were we penetrating Japan very well, the former probably our own failing—although it is compounded now—and the latter because we do not really have products that are so dramatically better now than the Japanese ones.

545. Will you be able to add value to the acquisition?

(*Mr Cruttwell*) Yes. Cambridge Instruments has a manufacturing base in the United States which Wild Leitz did not. We have had better sales organisation in the United States than Wild Leitz had. As to the new conglomerate, Wild Leitz will gain from that. We—the old Cambridge Instruments part of the operation—will gain. Wild Leitz had sales companies in a lot of smaller territories. In Scandinavia, for example, we use agents and they have their own sales companies; in Latin America we have agents and they have sales companies. We will gain some benefit from that. We will also gain stability. There will be a fairly substantial reduction in assets and in overall workforce in the new company and, I hope, natural attrition, though I doubt it.

*Lord Kearton*

546. Does the merger company have any manufacturing in East Germany?

(*Mr Cruttwell*) No.

*Chairman*

547. So you do your product development and improvement in several different locations?

(*Mr Cruttwell*) Yes. The scheme we have operated within Cambridge Instruments—and that will move into the new company—is that we have factories which are overall responsible for everything except selling. The Cambridge company is responsible for marketing and product definition and the development, manufacture and sales support of electron microscopes and lithography. Jung in Heidelberg is responsible for exactly the same, but for microtomes, and we have moved that product—microtomes—from the USA, which is moderately low labour cost, to Germany, which is



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MR IAN CRUTTWELL

[Continued

[Chairman Contd]

just about the highest labour cost I can find, primarily to avoid conflict between factories so one factory is obviously charged with the whole task. One of the Committee's questions was, how do we determine where to locate our R&D. The answer is, driven entirely by the factory. If I develop a microtome I will put it into the German factory, a development task, regardless.

548. What determines what you make where?

(Mr Cruttwell) It has been entirely history. It has been whichever plant has been the strongest at the time it came into the fold in that product line.

549. In the centres of excellence?

(Mr Cruttwell) Yes.

Lord Kearton

550. To what extent do you buy in components?

(Mr Cruttwell) Dramatically varying, but it is very high. The lowest is about 40 per cent bought out with microscopes and the highest about 80 per cent, perhaps even a little higher, with something like the image analysis product, which is an electronics product.

551. To what extent do you depend on your component suppliers for innovation?

(Mr Cruttwell) Virtually not at all.

552. Do they not make to your specification?

(Mr Cruttwell) Oh, I am sorry, I misinterpreted you; no, we are driven by standard off-the-shelf components. Despite the level of turnover we have at present we are far too small to control any components except for specific things like housing of an instrument. That is a casting specific to us and is therefore a component we control. The vast majority of our expenditure on components goes on standard components.

553. Is your workforce women or men?

(Mr Cruttwell) In the UK the bulk, including the bulk of our assembly force, is male. In Germany that is also the case. In America the bulk of our assembly workforce is female and of our component manufacturing workforce male. In Vienna virtually everyone is male; I do not think I have seen any female staff there.<sup>1</sup>

554. You are a design driven company essentially?

(Mr Cruttwell) Indeed, yes.

Lord Chorley

555. You operate in manufacture and design in England, Germany, Switzerland, Austria and the United States, so you have the experience to comment on attitudes and inhibitions in different countries. You are in a good position to comment?

(Mr Cruttwell) The worst has been North America. You have to remember that this is coloured by the very specific individuals. In every sense it has been hard to put new products into them and new production techniques.

556. They are just conservative?

(Mr Cruttwell) Indeed. We are dealing with a rust belt area, Buffalo, New York state—I would not recommend going there for innovation. It comes back to your earlier question about why we purchase. The area that has put in the most new products is the German operation. They have been most willing to develop a totally new product.

557. Is it a different culture in Germany or in the company? What explains the differences, why is Buffalo so conservative? Is it the culture of New York state?

(Mr Cruttwell) I think in that case it is the culture of the north east of the United States of America.

558. Are there any general lessons to be learnt?

(Mr Cruttwell) I do not know how many general lessons. The lessons I have drawn, which may not be general, are that our US operation has had to be kicked continuously. The German operation has been driven by their view of the technical excellence of what has been offered. In our case if I asked them for a business plan I will not say I get a "What's that?", but I find a lot of scrabbling to find an old piece of paper that is no longer relevant. They are however far more prepared to say, "That is excellent technology and we will therefore go ahead with it". In some cases this has worked very well; in others it has been a disaster.

559. It sounds as though you got them in hock to the bank.

(Mr Cruttwell) In this case it clearly did, yes!<sup>2</sup>

Lord Clitheroe

560. Who looks after the customers?

(Mr Cruttwell) The marketing operation in each factory is responsible for getting the input of customer ideas.

561. Is there any difference in the different countries?

(Mr Cruttwell) Yes, very different.

562. How do they rank?

(Mr Cruttwell) First, our market is different geographically. The US market for microscopes, optical and electronic, is heavily dependent on the semi-conductor industry and things that come from that. We therefore get continuous pressure in that

<sup>1</sup>My reply was wrong. In fact Vienna does have a similar proportion of women employees as our other factories.

<sup>2</sup>The firm Leitz was heavily in debt to the banks before they were acquired by Wild (to form Wild Leitz) which was before the merger between Cambridge Instruments and Wild Leitz to form Leica. It was not Cambridge that put them "in hock to the banks": when we "got them" (i.e., merged with their owners) they were in debt.

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MR IAN CRUTTWELL

[Continued

[Lord Clitheroe *Contd*]

direction whereas the European market for the same products, which is the next biggest market, is much more diverse and more generally industry-based. The US is interested in automatic handling and de-skilling of the use of the equipment and in production worthiness—can it sit in a plant and work? The European attitude in that regard is much more, “We’re going to put good people on to make it work—I want to know whether it does a particular task very well”. They will drive it more to that.

Lord Clitheroe

563. Does Europe include the UK?

(Mr Cruttwell) Oh, yes.

Chairman

564. I think you said each factory was responsible for its own manufacturing and its product innovation and therefore requires a customer input to know what it is going to design, but selling is done centrally?

(Mr Cruttwell) It is done territorially. The French market is addressed entirely by a French selling company responsible for all the products, whether they come from Cambridge or Germany or the US.

565. I see, not all done by the UK, but not necessarily from the French factory?

(Mr Cruttwell) There is not a French factory. That is why I picked France. In each territory there is one sales company responsible for all the product lines.

566. And the factory in America would get the customer market input for the French market from your French selling people?

(Mr Cruttwell) Exactly.

Lord Chorley

567. From what you have said you live in a pretty competitive world. Who would you regard as your three main competitors in your main product areas? Do they lead you, do you lead them? What advantage have they?

(Mr Cruttwell) In the scanning electron microscopes, the primary product from Cambridge, the main competitors are the Japanese, JEOL and Hitachi. The second major product out of there is electron beam lithography; the main competitor is JEOL, a Japanese company. In the case of Buffalo they make microscopes and ophthalmic products. Their main competitors are Nikon and Olympus, both Japanese; in ophthalmic, they are Topcon and Rodenstock, Topcon being Japanese again and Rodenstock being German. In Europe their main competitors in the past have been Leitz and Zeiss as well as Nikon and Olympus. Wezlar, the German company and the Vienna company both make research optical microscopes; their main competitors are Olympus and Nikon. Vienna makes ultramicrotomes, which slice very thin pieces to put under a microscope; Germany, optical microscopes

mainly for electronics, again their main competitors are Nikon and Olympus. Heerbrug in Switzerland makes surveying equipment, main competitors, Sokisha, Japanese. They make some defence products, but they are very territorially organised and tend not to have the same sort of competition.

568. So with one exception all are Japanese?

(Mr Cruttwell) In virtually every product the number one competitor is Japanese.

569. Does one draw any conclusions?

(Mr Cruttwell) Whether you do or not they have invested far more intellectual effort in their production techniques.

570. We were talking earlier about the different phases of product cycle and the fact that the Japanese put far more effort up front in getting things right at the specification level.

(Mr Cruttwell) I think that is also true. Our overall product introduction cycle is now probably about 30, maybe 40 per cent longer than our competition. It is hard to generalise because we have different cycle lengths for different products. It is also clear that a very large part of our development inefficiency comes from poor product specification. We do not have intellectual arguments up front to say what the products should be. We all agree it will have four wheels and allow someone later on to say, “We thought you meant four wheel drive”, thus changing the whole tack of the development. There is no doubt that is a major source of our internal development inefficiency. I think what has caused the Japanese to be our major competitor in most of those other areas is that they have spent the intellectual effort to get good production techniques. They have indeed pushed back into the development, and a good production technique relies on a stable product. The major pain is when you start to twiddle with our product.

Chairman

571. And you would like to do the same? From what you said earlier it is a nasty circle you would like to get out of and you would like to expand and invest in new products, but you have a relatively low cash flow because your profitability is not as high as you would like it to be so you cannot invest and you cannot get out of that circle? Have you tried to get what is usually described as “patient” money, long-term investment, to get you out of that circle?

(Mr Cruttwell) I have not had the feeling that we have been dramatically constrained internally by the inability to raise funds. That has rarely been the issue. If I wanted to get more capital in, provided I could live with the depreciation, I could do that. The difficulty has been as much one of an intellectual climate; certainly in the UK and US and to a lesser extent in Germany it has been quite hard to get people to put the same intellectual effort and thinking into the production area as it has in engineering and product development in the marketing area. It has been a major difficulty.



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MR IAN CRUTTWELL

[Continued]

[Chairman *Contd*]

572. It is a question of getting better people in those areas, which you are trying to do?

(*Mr Cruttwell*) Not very successfully, but yes, that is what we are trying to do.

573. Are you saying it is a manpower quality-of-people problem that is the first problem and, if you solved that, you would be on the road?

(*Mr Cruttwell*) Yes.

*Lord Chapple*

574. Is that regionally connected or salary led? Is it that you cannot get them in a region and for no money?

(*Mr Cruttwell*) We clearly do our best to get them for no money as well—we have not been successful! We have a slight regional problem in that there is high competition and moderately high house prices so we have had people come in and then have to leave because they could not find reasonable accommodation. I think the problem has been more that it is not a very big pool of people.

*Lord Taylor of Gryfe*

575. Why do you not move your factories out to the regions? There are 15,000 graduates leaving Scotland every year to travel south with all its high priced housing. There are nine Scottish universities turning out graduates every year, some technology based like Strathclyde, and you tell me you cannot get people?

(*Mr Cruttwell*) I did not mean to blame the high housing costs entirely. I was asked, were there any regional factors, and indeed there are. I also said they were not the major ones. We have had to move, not for that reason, but mainly for bringing people together when we have had successful mergers. When we have moved more than two miles we have had substantial losses of staff and disruption of work progress, which has taken quite a lot of effort to overcome. If we were to move a factory we would face substantial disruption—it does not matter where we are going. In my previous employment we moved a substantial number of people from Glenrothes down to Livingston—not exactly a great distance—not very far from a series of excellent universities, and they lost a substantial proportion of their development people, not because they did not like the new place but because, as soon as one moves, everybody knows there is disruption and the head hunters start to move in very rapidly. Therefore, I would not want to move a factory. In terms of setting up a new one, I would take into account exactly the sort of factors you have outlined, but regrettably I could not sensibly move a factory only for reasons of staff shortage.

*Chairman*

576. Do your comments on the difficulty of getting qualified people apply to Germany and America as well as the UK or is it peculiar to the UK?

(*Mr Cruttwell*) They certainly apply in America, but we are in a particularly bad location for recruiting people: Buffalo has a very bad reputation in the United States.

*Chairman*

577. You can get them in Germany?

(*Mr Cruttwell*) Yes, although amazingly it is quite difficult now to get mechanical engineers.

*Lord Taylor of Gryfe*

578. Are Barr and Stroud in your field?

(*Mr Cruttwell*) They are on the edge, I think is the right way to describe it. They were when they supplied things like binoculars, but now they supply them only to the Ministry of Defence, I understand, in exactly the same way as Kern in Switzerland provided to the Swiss army but no one else.

579. They do periscopes?

(*Mr Cruttwell*) They do quite advanced optical work, yes.

*Lord Chapple*

580. The nature of your product would require you to give a fair amount of training, whoever you took. What sort of facilities do you have for that?

(*Mr Cruttwell*) Specifically in the UK we have two training officers. Our total staff excluding sales is about 600 people. We do not now have our own apprentice school; we use the apprentice school at Pye locally. As to sending people out, we are spending in the region of 2 to 3 per cent only of our local turnover on training. We do not have our own training school.

*Chairman*

581. You said earlier that about half your products fail and half are successful?

(*Mr Cruttwell*) Yes.

582. What are the main reasons for failure when it occurs—a market badly judged or mostly technological problems or something else?

(*Mr Cruttwell*) Our biggest disasters have been where they really failed under the technology, but we did not realise that until it had gone to the market. Those were certainly the biggest failures.

583. You mean they sold and then were unreliable?

(*Mr Cruttwell*) Either they sold and then were unreliable or we built up substantial demonstration stock and diverted the effort of our sales people to these new, wonderful products, then discovered that they really did not work.

584. That was bad judgment of the market?

(*Mr Cruttwell*) No, it was bad judgment of the product. We geared them up to this new product that was supposed to work and it did not. In most

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Mr IAN CRUTTWELL

[Continued

[Chairman Contd]

cases the failure is not quite as clearcut as that; in most cases it is a mixture. The product limped in the wrong direction.

585. Just the wrong side of the line?

(Mr Cruttwell) Yes, that is the right way to describe it! It was both technical and market failure.

Lord Kearton

586. That is common enough!

(Mr Cruttwell) Is it!

Chairman

587. We have covered a lot of ground. Perhaps I may ask you why the company does not publish its R&D expenditure. In future of course you will have to under the accounting standard.

(Mr Cruttwell) I do not know is the answer to that. It depends upon the subsequent status of the company. Coming from Cambridge Instruments side I am responsible for the new technology and development in the new company and the first thing I did was to try to find out what we had and what we were spending. I had very nearly a two to one range between what someone said they were spending and what I thought they were spending—and they were not trying to be dishonest. In a company's reports there is only one virtuous cause for expenditure, and that is development. Therefore anything—writing down of goodwill, licence fee and central management—all got stuck into the R&D budget, and this was in one company that was supposed to be being honest with itself.

588. When you have got that sorted out you intend to publish the figures?

(Mr Cruttwell) If we are not obliged to publish the figures I am sure we will not.

589. Because you have no share market to worry about too much?

(Mr Cruttwell) You are hearing the opinion now of a technical rather than a financial man.

Lord Chorley

590. Where is the company registered?

(Mr Cruttwell) Cambridge Instruments Ltd. is registered in this country. Like a plc it is a holding company. It has a Dutch registration also. I think the answer—without getting myself hung, drawn and quartered by my finance director when I get back and tell him what I have said—is that if it is to our advantage to publish it—for example should it be legally required—there is no question that it will be published. We give other information as do most companies, but only where we think it is to our advantage. At present it is not to our advantage and we will not bother until it is.

Chairman

591. For competitive reasons really?

(Mr Cruttwell) Oh, I guess for reluctance of putting anything out. I do not think it tells our competitors anything they do not know.

Chairman] Thank you for answering all our questions so frankly on fairly detailed matters. We are most grateful to you for the constructive way you have helped us.



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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 2 May 1990

**3i PLC**

*Mr J Platt, Mr J Kirkpatrick and Dr C Desforges*

**BRITISH AEROSPACE**

*Mr I R Yates, Mr J Arnall and Mr D J Stewart*

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WEDNESDAY 2 MAY 1990

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Present:

Butterworth, L	Kearton, L
Clitheroe, L	Shackleton, L
Erroll of Hale, L	Whaddon, L
Gregson, L	

In the absence of the Chairman, the Lord Kearton took the Chair.

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### Memorandum by 3i plc

#### I 3i's EXPERIENCE

1. 3i has been investing in the UK for well over 40 years and during that time has invested over £4.5 billion in more than 10,000 businesses. Over half the current portfolio of around 4,000 firms is engaged in manufacturing industry and in the financial year to March 1989 some 50 per cent of investments made were in this sector.

Such a large portfolio together with substantial resources enables 3i to take a long-term view of its investments, whether equity or loan capital, with no requirement for realising the shareholdings. Some companies have been on the portfolio for over 30 years. Although we are active in financing large companies and have been involved in some of the largest management buy-outs, the core of our business remains very much in the small- and medium-size private company area—in the year 1988-89 some 51 per cent of investments were for amounts of £200,000 or less.

We have supported over 3,000 start-ups and early stage companies. Examples of those which have been engaged in innovative technology are Oxford Instruments, Domino Printing Sciences and Ross and Catherall.

2. In order to obtain an up-to-date picture of the experience of our portfolio companies with regard to implementing innovation and technology in their own business we conducted a telephone survey between 2 and 18 April amongst 218 of those engaged in the manufacturing sector. The results of this survey are incorporated in our evidence under the various headings. (A full copy of the results is attached in Appendix A).

#### II EVIDENCE

The form of this written evidence follows the specific questions tabled in the letter of 31 January 1990. Only those questions where 3i has experience or where the survey results are relevant have been answered.

1. *What are the effects of company attitudes and structures (including personnel policies, investment decisions)?*

- (a) Attitudes towards innovation in small- and medium-size companies depend to a large extent on the availability of both capital and personnel resources. Although the flatter management structure of the smaller business makes decision making more immediate and flexible than in a large concern, the amount of investment and skilled personnel time involved in introducing a new process or product can act as a constraint. In the case of new businesses based on innovation, the need to develop the market as well as the product increases the problem of assessing the business risk.

Smaller companies are generally unable to finance more than one innovation at a time so they need to be very certain of success before tying up valuable resources. It is often the assessment of the risk involved that proves difficult for these companies as they do not have access to the extensive market research facilities of the large company. It is the failure to assess the market correctly that most often becomes the stumbling block.

The fear of failure is an important factor in the UK where attitudes are more condemnatory towards this than in the USA for example. Those managements that encourage innovation should be prepared to accept a certain number of failures en route to developing a successful product or process.

In spite of these problems some 78.4 per cent of those questioned in our survey had introduced product or process innovations in the last five years.

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[Continued

- (b) Those issues considered to be very important obstacles of technological innovation were:

	Per cent Sample
Staff education, training and skill	53.7
Availability of finance	53.7
General economic climate	48.6

The training and skills issue was highlighted in a more general survey of 3i portfolio companies undertaken in June last year where some 66.2 per cent of those respondents from the manufacturing sector were experiencing skills shortages and 76.3 per cent expected such shortages in the future.

The importance of the general economic climate to the introduction of innovation was thought to be important by or very important by over 85 per cent of the sample and 10 per cent mentioned interest rates specifically.

- (c) Those issues considered to be unimportant were:

	Per cent Sample
Regulatory constraints on production	65.1
Customer resistance	45.0
Lack of market information	40.4

It is of concern that 40 per cent consider lack of market information to be unimportant. In our view lack of understanding of markets is a major weakness of many businesses.

2. *How active are UK companies in seeking out external technology, especially from overseas? How well do they adapt and apply it?*

- (a) The difficulty of transferring technology between countries is that of adapting it to a new market-place where different regulations and needs probably apply. In our experience most existing technology transferred between countries takes place between parent and subsidiary or associate companies.

Problems in this area relate to the difficulty of identifying useful technology in other countries and the lack of knowledge of the business of licensing.

- (b) About a fifth of the product or process innovations introduced by the sample over the past five years came from overseas, compared with a quarter from UK sources and over half from "in house" research and development.

3. *What are the respective roles played by product development and production engineering in technological innovation?*

- (a) The separation of product development and production engineering can result in problems of communication particularly in large companies where a number of departments are involved in the process of getting a new product to the market-place.

Technological innovation requires a team approach based on a project rather than a horizontal structure. Management needs to concentrate on issues relating to the project rather than get side tracked by the administrative issues concerned with departmental structures.

- (b) From the point of view of keeping product development and production engineering closely linked together, the smaller company is ideally placed to provide the right environment. It is interesting that over half of the innovations introduced by our sample stemmed from "in house" research and development.

4. *How effective are the activities of Government departments in promoting and supporting innovation?*

We are making an initial assessment of the SMART programme and establishing contact with potential users.

We feel that the provisions of the US Small Business Innovations Development Act 1982, coming into force as PA97/219 and its subsequent amendments, merit consideration as being of potential relevance and value to the UK and Europe. The object of the act is to amend the Small Business Act so as to strengthen the role of the small innovative firm in federally funded research and development procurement. The significance of this legislation is that it requires agencies involved in research and development to procure a fixed minimum of their contracts in small businesses.



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[Continued

It is interesting to note that of the innovations introduced by the survey sample in the last five years, only 2.7 per cent came from Government research laboratories.

5. *What are the effects of City attitudes to investment in innovation?*

- (a) City attitudes are generally perceived to be risk averse and short term. 3i is not in a position to comment on other financial institutions but we do believe that it is possible to take a long-term view of investment by providing the right mixture of loan and equity finance with no expectations of an early exit, and be profitable and successful from the point of view of the shareholders (see Appendix B).
- (b) Although it is true that about one in three start up companies fail within five years, 3i continues to finance this sector.

3i is also unique in that it has an "in house" investigation department staffed by experienced industrialists with an in depth knowledge of markets and technologies. This means that innovative products and processes are recognised and a financial package can be constructed so as to take into account the lengthy time period before the company can be profitable and self-financing.

- (c) It may be instructive to look at the reasons for being unable to finance some propositions in the new and innovative technology areas. Some of these are:
  - the product does not "stand alone" and is therefore not a basis on which to build a business. Maybe it should be an "add on" to an existing product;
  - there is no market for the product. It may be innovation for its own sake;
  - lack of awareness of international competition.

For a company to succeed in bringing a new product to the market our experience shows that above all the management team must be well balanced, commercially aware and encompass all the necessary skills, in particular those in the financial and marketing areas. It is vitally important that companies exploiting a new market with innovative products, are properly provided with long-term loan and equity capital to carry them through the first two or three years which are the most difficult.

6. *What is the effect of the legislative and regulatory framework concerning for example labour costs, patent laws and tax concessions on R&D and the purchase of know-how?*

It is our experience that legislation and regulations in this area do not appear to inhibit those companies or individuals committed to innovation. This is borne out by the survey results which show that 65 per cent of the sample do not attach any importance to regulatory restraints on production. However, as only 18.7 per cent of those that had introduced innovative products or processes were involved with transferring technology from overseas, the answers relate mainly to the U.K.

There is a genuine problem in international law on intellectual property rights which results from a lack of harmonization on such issues as: first to invent versus first to file an application; pre-application publication rights; costs of protection; specific technical issues in bio-technology; period of "real protection" which results from regulatory approval mechanisms. Small- to medium-size firms are at a distinct disadvantage in this area and efforts are needed to bring them up to date and ensure that they possess or have access to the required professional knowledge and expertise.

7. *How effective are the mechanisms for technology transfer from HEI's, Research Councils and public laboratories to manufacturing industry?*

Compared with the large amount of skills and expertise in public sector institutions there has been relatively little significant success in transferring the technology into commercial applications. The heart of the problem lies not so much in the mechanisms as in the failure to adopt a market approach to technology transfer. This is a commercial process requiring sound, detailed knowledge of markets, needs and future trends.

In response to this problem 3i has established Research Exploitation Ltd.

In relation to this it is significant that less than 3 per cent of the sample's product and process innovations came from government research.

8. *Does the UK benefit sufficiently from EC support for innovation? How might it be improved?*

Most EC support for innovation appears to be for large scale programmes such as Esprit. We are aware of few opportunities for the smaller company which find significant difficulties in benefiting from them. There seems to be scope for major improvements in this area.

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[Continued

9. *What are the effects of the varying relationships between companies and their suppliers?*

We do not see this as an area of concern solely for companies engaged in innovation or technology, but of more general significance. With the wider implications in mind 3i commissioned a research report [*Partners in Providing the Goods: The Changing Relationship between Large Companies and their Small Suppliers*, Study by Toby Robinson] last summer on the changing relationship between large companies and their small suppliers.

The main finding of this report indicates that single source supply is becoming the norm for larger companies and therefore there will be less opportunities in the future to break into the supply chain, especially for the smaller supplier.

10. *What factors influence decisions to invest in innovation in the UK or overseas?*

The main determinant of whether to invest in innovation is the quality of the people in the research and management team. This is confirmed by the survey where shortage of skills is seen to be a major obstacle to innovation.

We would also rate the ability to identify the market opportunities and assess potential competition and product life cycles as of major importance. Investigation of these areas, together with a technology and financial review, are part of normal 3i practice before an investment decision is made.

Only 38 per cent of the sample thought that the climate for innovation had improved over the last five years.

3i is building up a presence overseas and, in addition to the USA, now has offices in Paris, Strasbourg, Frankfurt, Madrid and Milan but it is too early to have any clear idea of the factors behind decisions to invest in innovations in continental Europe.

11. *In the light of ACOST's report "Defence R&D: A National Resource", and the Government's response, is there a satisfactory relationship between the defence and civil sectors?*

We do not have sufficient first-hand experience in this sector to comment.

### Appendix A

#### RESULTS OF 3i SURVEY ON TECHNOLOGY AND INNOVATION

A telephone survey was conducted amongst the manufacturing companies on 3i's portfolio at the beginning of April 1990.

#### *Profile of the 218 respondents by turnover size*

	Sample Per cent
Under £750,000	21.6
£750,001-£2,999,999	34.9
Over £3 million	31.7
Not recorded	11.9

## Q.1 Over the last 5 years, have you introduced any product or process innovations in your business?

	Replies	Per cent
Yes	171	78.4
No	46	21.1
N/R	1	0.5
Total	218	100.0

## Q.2 Please give the percentage of the total number of innovations from the following sources:

	Per cent number of mentions
Overseas	18.7
UK	24.2
In-house R&D	54.4
Government research	2.7
Sample	100.0



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[Continued

Q.3 Do you know of any innovations which would improve your profitability but which you have not been able to introduce into your business?

	Products replies	Per cent	Processes replies	Per cent
None	93	42.7	93	42.7
A few	102	46.8	77	35.3
Many	12	5.5	15	6.9
N/R	11	5.0	33	15.1
Total	218	100.0	218	100.0

Q.4 Please indicate how important the following list of issues are as obstacles to technological innovation.

	Important		Very important		Not important		No response		Total	
	Replies	%	Replies	%	Replies	%	Replies	%	Replies	%
Taxation	90	41.3	49	22.5	77	35.3	2	0.9	218	100.0
Staff education/training and skills	73	33.5	117	53.7	27	12.4	1	0.5	218	100.0
Availability of finance	73	33.5	117	53.7	26	11.9	2	0.9	218	100.0
Regulatory constraints on production	57	26.1	18	8.3	142	65.1	1	0.5	218	100.0
General economic climate	80	36.7	106	48.6	30	13.8	2	0.9	218	100.0
Pricing constraints	79	36.2	64	29.4	74	33.9	1	0.5	218	100.0
Customer resistance	67	30.7	50	22.9	98	45.0	3	1.4	218	100.0
Lack of market information	65	29.8	59	27.1	88	40.4	6	2.8	218	100.0

Q.5 Would you say the climate for innovation has improved or deteriorated compared with five years ago?

	Replies	Per cent
Improved	82	37.6
Deteriorated	73	33.5
No change	61	28.0
No response	2	0.9
Total	218	100.0

Q.4 and 5

Importance of obstacles to innovation against change in climate for innovation.

Change in climate for innovation					
	Improved per cent	Deteriorated per cent	No Change per cent	N/R per cent	Sample per cent
<i>Staff education and training</i>					
Important	31.5	39.7	27.4	1.4	73
Very important	42.7	29.1	27.4	0.9	117
Not important	29.6	37.0	33.3	0.0	27
No response	100.0	0.0	0.0	0.0	1
<i>Availability of finance</i>					
Important	42.5	26.0	31.5	0.0	73
Very important	33.3	41.9	23.9	0.9	117
Not important	38.5	19.2	38.5	3.8	26
No response	100.0	0.0	0.0	0.0	2
<i>General economic climate</i>					
Important	37.5	28.7	33.8	0.0	80
Very important	30.2	45.3	23.6	0.9	106
Not important	63.3	3.3	30.0	3.3	30
No response	50.0	50.0	0.0	0.0	2

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[Continued

*Other obstacles to innovation mentioned specifically by the respondents*

Interest rates	22
Staff/Skills shortage	12
Government/EEC	9
Finance	4
Customer attitudes	3
Other firms/outside R&D	3
Technical problems	3
Overseas imports/customs	2
Lack of land	2
Economic climate/demand	2
Time constraints	1
Environmental concerns	1
Internal attitudes	1

### Appendix B

Recent 3i Performance	1989	1988
New Investment	£581m	£537m
Revenue Before Tax	£66m	£46m
Total Return After Tax	£232	£133
Dividend per Share	8.75p	7.25p
Return on Opening Shareholders' Funds	24.4%	15.9%
Value of Investments	£2,515m	£2,202m
Shareholders' Funds	£1,167m	£954m
5 Year Compound Growth in Net Assets per Share	22.7%	22.3%
Number of Employees Worldwide	889	781

#### Invested in The Year

£181m in 108 Management Buy-Outs  
 £61m in 222 Management Start-Ups  
 £15m in 42 Management Buy-Ins  
 £279m in Growth Capital  
 51 per cent of investments for amounts of £200,000 or less

#### Profile of Portfolio

We estimate that in 1987, companies in the 3i portfolio employed up to 800,000 people, had a total turnover of approaching £50 billions and had exports of over £4 billions.

### Examination of Witnesses

MR J PLATT, Director, MR J KIRKPATRICK, Chief Industrial Adviser and Director, 3i plc, and DR C DESFORGES, Chief Executive, 3i Research Exploitation Ltd, called in and examined.

#### Chairman

592. Mr Platt, may we welcome you and your colleagues and thank you for coming to give evidence to us. The Chairman of this Sub-Committee is, in fact, Viscount Caldecote, who is very well-known to you, but he was not able to be present today. Do you wish to make an introductory statement of any kind?

(Mr Platt) I do not think so, no.

593. Could you remind us: 3i is a descendant of a company set up many years ago when I think Lord Piercy was the first Chairman?

(Mr Platt) Yes. 3i is the successor (if that is the phrase) of ICFC, which was founded in 1945. In about 1974 ICFC was amalgamated with FCI, which was also founded in 1945. Those two

businesses were combined. We changed the name to Investors in Industry in 1983 and it became 3i shortly after that, so it is the successor to ICFC.

594. My recollection is that its initial funds were provided by the joint stock banks plus a few industrial companies?

(Mr Platt) The share capital of ICFC has always been provided by the clearing banks and I believe that was also the case with FCI. The clearing banks and the Bank of England are our shareholders.

595. They are still your main shareholders?

(Mr Platt) Indeed, so that the share capital is within the clearing banks and the Bank of England.



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MR J PLATT, MR J KIRKPATRICK  
and DR C DESFORGES

[Continued

[Chairman Contd]

*Lord Gregson*

596. What is the proportion, roughly?

(*Mr Platt*) The Bank of England has 15 per cent. The other clearing banks have varying proportions. From memory, I think the National Westminster Group is the biggest, with about 23 per cent.

*Chairman*

597. Do the banks play a part in the executive direction of the company at all?

(*Mr Platt*) Not to a significant extent. The Chairman is appointed in consultation with the banks and I suppose one might say he is their representative, although that is perhaps too strong a word, but in terms of the day-to-day management of the business, no, we manage the business independently.

598. Do the banks ask for more information from you than you publish in your written accounts? In other words, do they regard you as their innovatory arm and really monitor your progress as providers or backers of innovation?

(*Mr Platt*) I would not go so far as to say that. There is no doubt, of course, that they do watch our activities closely and we operate within guidelines agreed with them as to the objectives of the investment policy and do, of course, keep them informed, but I believe they see us essentially as an investment and are, therefore, interested in our progress as an investment but are concerned to ensure that we follow the policy that we were set up to do.

599. From the documentation which you very kindly provided, one's impression is that in the last few years you have become much more like an innovatory arm of a merchant bank. It is interesting the amount of money you have invested in management buy-outs and things of that kind, and when it comes to new investment, your investment absolutely for innovatory purposes out of your total investment of just under £600 million, the impression is that it is quite small?

(*Mr Platt*) I think the fair answer to give is to say that our principal objectives have always been to provide long-term capital, and permanent capital, to businesses without access to the capital markets. That was the basis on which we were originally set up and that is the objective that we have pursued, so we have always seen our market as companies requiring long-term capital and we have never distinguished amongst different sectors or types of businesses, so that a company in any trade, provided it is viable and pursuing a proper commercial policy, is eligible for our money. We are certainly happy to finance new businesses, we always have done that but we are also happy to finance more mature businesses. When it comes to management buy-outs, we developed to a large extent within the UK the

techniques for management buy-outs but we just saw that as an extension of our normal activity of providing long-term capital, so that we have never focused specifically on financing innovation or any other particular sector but have said if a person or company approaches us with what we consider to be a viable proposition then we will provide capital if what they require is long-term and permanent capital. What we will not do is to provide short-term working capital facilities, which would, of course, be the remit of our parent shareholders.

*Lord Gregson*

600. But there is a difference, of course, between short-term capital and permanent capital. There is a whole gap in the middle which has recently gone by all sorts of names—mezzanine business, etc. Do you really mean permanent capital or do you mean longer-term capital?

(*Mr Platt*) I mean both, in the sense that we will subscribe share capital which I will classify clearly as permanent capital and we will provide long-term loans. Our definition of a long-term loan would be one with a maturity of between 5 and 20 years typically.

601. Share capital is not always permanent capital, is it, if there is an exit?

(*Mr Platt*) We do not as a rule dictate the exit.

602. But it often happens, does it not?

(*Mr Platt*) Indeed, it frequently does, but we would subscribe share capital into a business without requiring from that business any commitment as to when we would realise the share capital, so we regard it as permanent and committed. The experience we have is that there are some companies we will never exit from. We have investments still on our books which we made in 1948. More typically, there will be a turning-over of the portfolio as companies sell out or go public or what have you, but we do not demand that, so one can genuinely offer them permanent capital.

603. It does help them all over again when you get an exit with a nice ratchet attached.

(*Mr Platt*) Indeed.

*Chairman*

604. I think we feel that 3i and its predecessors have been one of the great success stories of the British system, so please do not regard what I am saying as any sort of criticism, but one cannot help noticing your return on shareholders' funds is very handsome and your five-year compound growth in net assets per share is nearly 23 per cent., which is a very good figure by anybody's standards. I wonder whether your preoccupation has moved more to maintaining this extremely good financial curve?

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Mr J PLATT, Mr J KIRKPATRICK  
and Dr C DESFORGES

[Continued]

[Chairman Contd]

Does that inhibit your investment policy now in any way? In other words, are you more averse to taking risks because you have this marvellous record of growing assets per share, growing return and, therefore, the temptation not to do anything which might give anyone a knock must be present in everyone's mind?

(Mr Platt) No, I do not believe that we have become more risk-averse. I should say we have probably taken proportionately more risk in recent times. The stronger our balance sheet, the stronger our P & L account, the greater our ability to take risks. So we clearly see it as an important objective that we make a proper return in order to be able to take the risks that we do. I should perhaps have added that, although our share capital is provided by the clearing banks, we do raise debt in the public markets and we have clearly a good rating in those markets which is a function of our performance, and we need to maintain that rating to be able to borrow our money at the cheapest possible rate. But taking the point, I think although our objective is to make a proper return, we have stuck to our policy and are not less inclined to take risks than we were.

605. One reason I asked the question was because we have occasionally, though not in this particular inquiry, had the help of the European Investment Bank as witnesses. They have an enormous amount of money to invest in developing infrastructure in Europe and so on. We discovered they were extremely risk-averse; although they were originally set up with the idea of doing things the market would not do, they seemed to be more conservative than most of the market. Can I go to another question? I was not very clear about Appendix B, revenue before tax for 1989 £66 million and total return after tax £232 million. Why are the two figures so different?

(Mr Platt) We consider our return in three ways. We have revenue profit, which is the surplus that we earn on the loan margin on the loans we make and the dividend income we receive on the share investments we hold, and from that, of course, we have to meet our normal operating costs. So we have our revenue profit—that is the £66 million in 1989; we then get realisation profits which come as capital profits on the equity holdings that are disposed of. We have a third return which we measure which is the increase in value of the equity holdings which have not been realised and that is something that is reflected in the growth of the balance sheet, but that is a growth which, of course, we can only receive when the company is realised. But in the meantime the holdings we have we do revalue on a very conservative basis. The £232 million total return is a confirmation of those three elements.

606. Is it fair to say that most of your return there is due to good investments made in earlier years?

(Mr Platt) Yes. One of the reasons why in the last few years we have been showing good returns is with the rising stock market and a lot of activity in company disposals, of course, we have been getting realisation gains and our equity holdings have been increasing in value. What we are conscious of all the time is that those gains are outside our control and, therefore, can be subject to changes in economic climate, downturns in the stock market. So the figure that we are most conscious of is our revenue; we must make sure we generate enough annual revenue, of course, to meet the operating costs of the business.

607. The larger figure is just a reflection of the general rise in market values in the last few years?

(Mr Platt) A great deal of it. Of course, the realisation profits are equity portfolio turnover. It is always dangerous to quote averages, as you will know, but an equity shareholding probably turns over every seven years on average.

Lord Gregson

608. Do you have a figure for total return before tax?

(Mr Platt) I regret not with me. I would have to provide that separately.

609. It is strange that you do not quote it because actually in many ways it is a much more important figure than return after tax. Tax is a mistake that occurs on the way. Could you let us have it?

(Mr Platt) Yes.<sup>1</sup>

Lord Clitheroe

610. Do you therefore need to go back to your shareholders for capital? Have you ever done that? What attitude would they take to that?

(Mr Platt) We certainly have gone back to them for capital but it has not been frequent. I think I can only say that they remain supportive of us. We do not, as it happens, require additional share capital at this stage and the loan capital we can raise on our own balance sheet in the markets. But the shareholders are supportive of what we do.

Lord Whaddon

611. I remember way back in the 1940s when you were originally founded the thinking behind the organisation was that the banks were maybe lacking somewhat in the capability of technical assessment of ideas and that your organisation would be better able to assess the long-term prospects. You have obviously been a success. Do you feel that the banks have learned anything from your experience and do

<sup>1</sup>Note by the witness: The before tax total return figure for the 3i Group is £314.3 million.



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[Continued]

[Lord Whaddon *Contd*]

they now carry out more thorough and more competent technical assessment of possible investment or do they tend simply to pass all these ideas over to you?

(*Mr Platt*) I am nervous about commenting on the banks. They have, of course—or most of them anyway—set up their own development capital, venture capital, funds. I really do not feel I am competent to comment on how they make their assessments. Taking the point about our own process, certainly one of the features of 3i from its very early days is that we recognised that to make investments in small businesses in the risk area we would need to understand those businesses thoroughly and accordingly we have always run what we call our industry department, which is a team of people with substantial industrial experience who evaluate propositions alongside the financial stream and perhaps, Lord Chairman, I could ask John Kirkpatrick to say something at this stage because this is the department that John heads.

612. Also do you feel that you have a role producing an increase in the flow of long-term capital overall in the banking system, or do you just act as a channel for funds which would otherwise go elsewhere?

(*Mr Platt*) I think there is no doubt that we have been a success and we now invest £600 million a year on a long-term basis. We are being copied and I suppose that is some reflection of our success. An example of that is the fact that the clearing banks themselves have subsidiaries of their own doing similar things. I would like to believe we have increased the flow of capital to the unquoted sector, yes.

(*Mr Kirkpatrick*) Certainly in answer to one of your questions as to how we do it differently compared to our competitors, as my colleague has mentioned, we do have an industry department of which I am head and that is staffed typically by people who are in their late 40s, all typically ex-managing directors, with scientific or engineering qualifications, who have all run businesses themselves.

So all my colleagues in the department know some business sectors very well indeed. This enables us to judge the business propositions that come before 3i we believe very well and actually enables us to take risks when other people cannot because we can actually judge the people, the situations, the technology and the markets. Our competitors tend to use sometimes outside consultants or try and do it themselves. We believe that is a terrific strength of the 3i Group.

Chairman

613. Are your clients referred to you by the clearing banks? Where do your clients come from? How do your clients make contact? Do they go to the manager, because your chief stockholders are the

clearing banks, and they say, "We advise you to go and talk to 3i," or do your clients come to you directly?

(*Mr Kirkpatrick*) Specifically our potential customers come to us through talks with the accountancy profession, who say, "I would advise you to go and talk to 3i," or some other part of the financial community, who say, "3i will probably be your best home."

614. Do you turn down a considerable proportion of applications?

(*Mr Kirkpatrick*) We certainly do turn down some, yes. It is difficult to get an exact percentage because we try and sift them very carefully early on, so sometimes say no to people as early as possible because it is unfair to build up people's expectations.

615. Do you liaise with the British Technology Group?

(*Mr Kirkpatrick*) Sometimes, but really their business is a fair bit different from ours because we are normally going for equity stakes and a long-term relationship with a company rather than the BTG approach.

616. The BTG is all the time looking, as it were, for ways of getting innovation going in industry. It is looking for a certain amount of advice, sometimes a certain amount of investment cash, but it crosses one's mind that they may be at some stage the place to go but it really now requires more ordinary banking finance and an organisation with the reputation of 3i is the right place to go to, but you do not have a working relationship with them?

(*Mr Platt*) Yes, we do. We maintain contact with a very wide spectrum of other investing organisations and we do have connections with the BTG and will work with them. The essence is that we become involved at the stage where the business is looking for long-term capital to develop. We would not necessarily be involved in financing research but we would be involved in the financing of the commercial exploitation and, therefore, we interface with a variety of organisations.

617. Do people like the Prudential come to you for advice?

(*Mr Platt*) They would not come to us for advice, I do not think, but they do, of course, have their own small venture capital fund now and we do joint investments with them. We share investments on a syndicated basis with a wide range of organisations and they would be one.

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[Continued

*Lord Gregson*

618. Have BTG changed considerably in the last few years from investment in developing research and invention to being more a licensing expertise body? Are they not vastly different from what they were five years ago?

(*Dr Desforges*) If I can respond to that question, I would say indeed that is the case. I do in part believe the reason for the change is related to the fact that the government of the day decided that the rules under which BTG had access to the fruits of government-funded research should be thrown open to a wider marketplace.

619. Was it not also due to the fact that the Government thought they were in danger of funding near-market research and that was not government policy?

(*Dr Desforges*) I recall reading that is what was said but I am obviously not in a position to confirm that that was the reason for any decision.

620. Can you give us a rough idea of how many investments you make which are syndicated compared with what I would call pure 3i investment—just a rough idea?

(*Mr Platt*) Roughly, I would say we would syndicate no more than 5 per cent.

*Lord Clitheroe*

621. Might I ask about the criteria that you use in decisions, particularly those related to risk elements, and also the extent to which, when you are going through the process, you find that the market forecast is almost always the most tricky one to go for? How do you handle this decision process of whether you are going to invest or not?

(*Mr Kirkpatrick*) That is probably the hardest thing and you have put your finger on it. I think the first thing you have to judge before the market is the people. The management and the quality of the management are really absolutely key and if you can get a good management team, and not necessarily a good rest of the team they have a chance. The other way round they probably have not a chance. So what we tend to concentrate on is making sure you have a management team there that can function as a team and hopefully can grow with the business and can be flexible enough to cope with the changes and problems, especially in the start-up phase of the company. The next bit, which is virtually as important but not quite, is, as you said, the market, and it is actually gauging whether there is going to be a market for that product, whether there are maybe going to be foreign competitors coming in, whether they are going to be superseded quickly, how long it is going to take them to get into the market, where they do it, because some of my colleagues have in-depth knowledge of particular sectors and they know where to go and look for the evidence, so they

can be quite intelligent sounding-boards in terms of questioning of management and really do listen to what they are actually saying, because frequently if you do not get that top line sales figure right, everything else beneath it is absolute rubbish. So it is getting the people right and the market and then obviously the technology, but those first two, with the people first, is the way we do it.

*Chairman*

622. How do you break it to the people you are turning down? Do you say they are inadequate managers or it will not sell in the market or the product is no good or what?

(*Mr Kirkpatrick*) When you are doing that sort of thing, obviously you end up talking to people as equals. If you have done your job properly, they will actually realise they have made the mistake and they are wrong. It is very seldom we find—if we do find—that it is our fault—that we have not been able to sell the negatives enough to them to prove they are wrong and we are right. If it happens the other way round, we have a nagging doubt that we are wrong, we are very careful always to act as a feedback loop all the time to persuade people that yes, maybe if we change it that way it could work, or if we change it this way it could work.

Chairman] Which is a very constructive and extremely sensible way of going on.

*Lord Erroll of Hale*

623. Can I ask whether you have what I call human preferences for one type of industry rather than another? Do you feel more at home with the small- and medium-sized engineering companies or do you feel happy with wool textiles companies or innovative retail chains, or are you entirely indiscriminate in the nice sense of the word?

(*Mr Platt*) I think we are, yes. About 50 per cent. of our investment each year is into manufacturing and that has been the case over many years. It used to be greater than that but in recent years it is about 50 per cent into manufacturing.

We never really rule out sectors. We will always take the view that any viable business is one we will support. I think about the only things we have turned our face against are betting shops and casinos which we do not see as being our job to finance. But other businesses we would support.

624. If two companies come along and one is more strongly innovatively inclined than the other, would you give priority to the company which seemed to have, to put it colloquially, more bright ideas than the other one, or do you assess the brightness of the ideas in a cold-blooded way?

(*Mr Platt*) We are not resource-constrained, so we are not limited as to how many propositions we can finance in a year. So we are fortunate that we never really have to make choices between viable propositions. So we would do both if both were



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[Continued

[Lord Erroll of Hale *Contd*]

supportable. We do not have to be selective. We are equally keen to support the innovative business as we are the steady performers and both of them can be a home for our money. Clearly the distinction is in the terms you can offer.

*Lord Clitheroe*

625. It is very interesting to hear that you do not have to be discriminatory on the basis of availability of funds. I wonder whether this implies that not enough people are coming to you because you very seldom get a market which is as well in balance as that implies.

(*Mr Platt*) Well, we have certainly always felt that there was a lack of opportunities. We actively seek opportunities. We have developed a network of offices across the country with that purpose in order to get as close as possible to our potential market. We advertise extensively. We market in a variety of ways. We are constantly looking for opportunities. So we believe that that is more of a problem than funds. We believe funds are available for the right proposition.

*Lord Gregson*

626. Your recent advertising seems to have concentrated on buy-outs as being the main course of business. It has been said that investment in buy-outs is sterile money, which is merely replacing existing capital and, in fact, is robbing the venture capital market of funds that really ought to be directed in that direction. Why have you concentrated so heavily on the buy-out? Less risk? Better returns?

(*Mr Platt*) There is certainly less risk in buy-outs than there is in many other forms of investment, that is true. There certainly have been good returns.

627. You keep out of the retail sector?

(*Mr Platt*) I believe returns on buy-outs are dropping.

628. That is because of the retail sector.

(*Mr Platt*) It is certainly because of the changing economic conditions but also because a lot of money has been sucked into financing them.

629. Why do you concentrate on advertising your buy-outs?

(*Mr Platt*) I am not sure I accept that we do. We try and advertise 3i and we try and advertise a range of activities and I am not conscious that we have given prominence or pre-eminence to buy-outs.

630. I am sure over the past year or so your advertising for buy-outs has dominated your advertising from my point of view, reading the newspapers.

(*Mr Platt*) Yes. It certainly is not as a function of any policy directive because we are continuing to invest in a spectrum of businesses from the start-ups through to the mature business looking for development capital.

(*Mr Kirkpatrick*) I think, my Lord, one has to remember that, apart from the big management buy-outs and maybe the retail sector that is publicised, we do a lot of buy-outs of, say, small divisions, engineering divisions of major companies. We look at some of those small buy-outs in a way virtually as start-ups because those management teams want to do their own thing and the fact that they can buy out their divisions gives them a flying start. So the smaller buy-out is virtually a start-up.

631. Comparatively low risk and good returns. The Chairman of Lazards (until he retired) told me "Please send me some more pedestrian engineering companies".

(*Mr Kirkpatrick*) It actually does give a lot of management teams a terrific incentive.

*Chairman*

632. Some of the buy-outs of small engineering divisions have been extremely successful for the economy as a whole which is very pleasing. You said you had set up regional offices to give more extensive coverage. Why do you set up offices overseas? I am not quite clear why you are spreading internationally.

(*Mr Platt*) I think there are two reasons. Clearly we have taken the decision that Europe is and is going to be an important market for the UK and that we should have established offices there so as to be able to support our portfolios who may wish to expand into Europe.

633. Is it to support UK clients moving into these countries?

(*Mr Platt*) We certainly see that as one of their functions. We are predominantly aiming to finance indigenous businesses in those economies but there will be a secondary objective which is to provide some cross-fertilisation between our UK portfolio and the European businesses.

634. If I understand you correctly, you really want to say to enterprising Frenchmen, Germans and so forth, "Come to 3i and we will finance you"?

(*Mr Platt*) We would say that certainly. But if one of our UK businesses was looking to expand in France for example we would through our French office be able to provide him with some help and we see that as another objective.

635. You say you are not resource limited, but the implication is that not enough business is coming forward from this country to give you growth?

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and DR C DESFORGES

[Continued

[Chairman Contd]

(Mr Platt) Certainly we are looking to expand the business generally and Europe is a market to expand it in.

Lord Whaddon

636. You say here that in 1989 some 50 per cent of investments were in manufacturing and I believe you said that in previous years it had been a higher percentage. Can you give a little more detail? By how much has it dropped and for what reason?

(Mr Kirkpatrick) It does fluctuate up and down in various years. The year before I think it was up to about 56 per cent so it does fluctuate up and down. In that total manufacturing sector in some industries in some years we would put more in if they are in a boom situation because they need the funds and in other years they do not. So actually it is very much swings and roundabouts between a lot of industry sectors.

637. Going over ten or twenty years, has there been a trend downwards or not?

(Mr Kirkpatrick) Certainly in the last five years there has been a bit of a trend, but not too significant, no.

(Mr Platt) I would say it has declined over time. Now, I would not want to say why that has been. It has not been because we have not been willing to finance manufacturing. It is the fact of where the opportunities are.

638. The concern at the back of my mind is the feeling that Britain has become de-industrialised. I wonder whether your figures reflect this.

(Mr Kirkpatrick) It is quite difficult because some of the service sector industries we do back now may be computer bureaux or something traditional. Those are the type of departments that would once have been inside existing companies; in other words, existing companies tended to do all their own thing. So I think the actual structure of businesses in the United Kingdom has changed, which has maybe actually offset the figures. So you would have to look at that in parallel with looking at what our investments are.

Lord Gregson

639. The trade figures demonstrate without a doubt that British manufacturing industry has shrunk, do they not?

(Mr Kirkpatrick) They do, my Lord, but —

640. There is an enormous difference in ten years.

(Mr Kirkpatrick) But our portfolio does not, I think, mirror what the actual trade figures say because we are predominantly in the small- to medium-sized business sector.

Chairman

641. I will turn to Dr Desforges, if I may. Our main consideration is innovation and the part it plays in industry and to a certain extent all our questions so far have been addressed to a picture of where we are in the round. We are very grateful indeed for the very frank way you answered our questions. Would Dr Desforges like to expand on his remit? The impression I get is that he set up his own company and then you bought him out.

(Dr Desforges) Perhaps I could explain this rather more clearly. Back in 1984 I was approached to see whether, whilst I was working with an American company, I would head up a new joint venture between 3i plc and an American foundation, the Research Corporation based in New York (soon afterwards they moved out to Arizona). The reason for the joint venture being created was centred basically around the interests of 3i to move closer to the scientific and technical interface of innovation, using the expertise gained by the Research Corporation from 75 years of experience in taking, if I may use the phrase, academic invention at the source through to innovation.

They were set up in 1912, based on some work done by a physical chemistry professor, and he had the remarkable prescience (a) to recognise that his research could be utilised, and (b) then to plough the funds back in in order that he could further expand his business. So the joint venture was funded from 3i providing an element of capital to this plus the expertise and experience of the shareholder organisations. You mentioned the British Technology Group, Lord Gregson. A major incentive which enabled the joint venture to start up came from the Government's decision basically to open this marketplace because, as I am sure your Lordships are all aware, there has been a very similar move in the US from the Federal Government's point of view to put the responsibility for moving innovation into the hands of the people concerned with it rather than dumping it into an agency and leaving it. The statistics that I looked at said that 4 per cent. of inventions made by Federal money actually were being taken over towards the marketplace, because clearly it is a long-term process, and it has now increased to 33 per cent, which seems to demonstrate the need for individuals to take responsibility. The joint venture, therefore, based on this analysis, was created and basically we were seeking inventions in academic institutions, polytechnics, universities, private individuals, one or two of the Government research laboratories and research councils, particularly the Medical Research Council, for example. We basically set up an operation which would enable us to have access to these institutions in order to carry out audits of the research portfolios that existed and, rather on the lines of my colleague's Industry Department, I basically have seven professional people who have on average about 20 years' experience of industrial and commercial research aimed at producing innovation, plus



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experience gained outside the UK. So we have built a highly concentrated nucleus of professional expertise and experience which we could bring to bear at a much earlier stage and clearly at much higher risk. The joint venture had a four-year initial cycle and at the end of the first four years of the agreement Research Corporation basically felt that it had fulfilled its own charter, which was to help to stimulate this activity, and 3i expressed an interest in taking this over entirely. I was perfectly happy to sign an agreement that this should be the case and we have moved on since then really into grouping our efforts so that 3i has a seamless operation from the investment of this so-called embryonic capital, (actually the very early capital you want to put into an invention without knowledge of the commercial outcome, but, of course, taking account that the risk is very high, to try to see if we could improve our knowledge of these two outcomes, so that we can manage our funds better due to the skill of the management itself), through to venture and development capital.

642. Can you tell us what progress you are making?

(Dr Desforges) I would be pleased to, in so far as I can without breaching any confidentiality of our agreements. We have agreements with 54 institutions—UK universities and Research Councils. I think overall we have seen of the order of 1,000 projects. We have assessed in very great detail—and I do not mean the other ones were less well assessed but it was more immediately obvious that the commercial potential was not there—I think the figures for 1 May, yesterday, were 266, and we have currently 45 which are available for exploitation, and of those 45 we have ten licensed currently to manufacturing industry.

643. What sort of investment have you put into it?

(Dr Desforges) First of all, a very important criterion when one is putting money into a very risky, basically unsecured position, is that we attempt to secure our position around the intellectual property rights, so there is an investment in identifying and protecting these. We then have investment, this so-called embryonic capital. In one case we put £80,000 simply to move the development base forward. We placed a contract into the university department concerned to enable them to carry out further work which enabled us to license the technology without the patent having been granted, and we think it is a very important feature, when the innovative import may not be too visible, to attempt to address these two issues of commercial and technological risk.

644. There is a great deal of interest in many large companies now in forming tie-ups with the universities, and one thinks of Imperial College or

Oxford or Cambridge or some of the new technology groups. Take Warwick, which has very close tie-ups with the motor industry. It has always seemed to me anything which arouses the interest of British industry to get stronger links—and it seems to me they are getting stronger links—between institutes of education and manufacturing and commercial units is a very good thing. What I am not clear about is what you are doing that the companies are not doing for themselves?

(Dr Desforges) We would like to think we are offering to the academic institutions an intermediary role to enable them to address this whole issue rather than having to deal necessarily with a large company. I perfectly well recognise and agree with you that the large companies know extremely well how to deal with the university sector. I would venture to suggest that the small- to medium-sized companies find it very difficult indeed to address the universities, for a variety of reasons, in order to seek access at this point. I would say particularly from my own experience in recent years that one of the problem areas small businesses have is in relation to intellectual property rights, first of all to recognise really what they are, to recognise their potential value, to be able to understand and recognise the legal processes that are associated with protection of intellectual property rights and how to get value from them. So we have been working both with the academic community to awaken their interest and to alert them to these possibilities as well as addressing the small to medium manufacturing sector by holding seminars and “teach-ins”, explaining how innovative potential can be realised from academic research. You mentioned Imperial College. The Committee may be interested to learn that we have formed a joint venture company called IMPEL with Imperial College in order to enable the College fully to benefit from the potential of the institution, both in terms of its ability to provide consultancy, contract research, technology, agency licences, and access to the very special facilities that the College has. This is working as a joint venture, with the College having a majority shareholding. To date the company has been profitable; it actually paid a dividend last year and the College has just renewed the agreement for a further three years to enable this company to move forward. So even with an institution which has international renown and very good contacts with the large companies, they did feel, after an independent analysis, that it was worth working through this intermediary organisation to obtain what they would term a fairer deal with industry.

645. You think this is a growth area now for 3i?

(Dr Desforges) I would venture to suggest it is. I have a certain experience in dealing with Western Europe. I am a member of the board of management of TII (Technology Innovation and Information), which was initially funded by the European



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Commission and is now functioning as a free-standing body, and the aim is to enable technology to be moved around Europe, particularly in small- to medium-sized companies, by creating a network rather like the network concerned with financial organisations, to enable technology to be moved around, not only from the well-off areas technologically to the less well-off but also between industrial sectors.

So you produce a more level playing field. In other words, the technical differences will lead to less effective competition, it can be more levelled out, and there I see very active participation from the academic sector and we have been asked by the Commission to look, in fact, at the possibility of creating an IMPEL-like organisation which would link maybe a major institution within each of the Community countries to form an embryonic exploitation company and enable them to work more closely together. We are very supportive of this and investigating how this might be brought about.

Lord Gregson

646. It does resemble a private sector BTG.

(Dr Desforges) I think that is a not unfair comparison, my Lord.

647. On the questions the Chairman asked about large companies versus your activities, is there not a factor in the universities? Many of the staff of universities are suspicious of large companies and do not want to get sucked in, they would rather do their own thing.

(Dr Desforges) I think there is more than an element of truth in that, in that they feel that they are rather more at the mercy of large companies.

648. Get more out of it?

(Dr Desforges) That is possibly so. That is a viewpoint the universities have expressed to me.

Chairman

649. Could I take one thing which struck me in your report. You mention on page 5 that "... of the innovations introduced by the survey sample in the last five years, only 2.7 per cent came from Government research laboratories." That seems a very unhappy thing.

(Dr Desforges) Well, you are asking me, I think, to comment on a survey. These are results that arose from a survey we carried out.

Lord Gregson

650. What is your own experience?

(Dr Desforges) Of the Government research bodies *per se* or academia?

651. Well, the Government funded research laboratories versus academia from that point of

view. In previous investigations we have had comment on this, where the Government research laboratories have turned out rather poorly compared with university departments in the amount of innovation that they provide. Is this the sort of level of activity which is your own experience?

(Dr Desforges) Well, my Lord, I am afraid it would be very much reflected in these figures. I mention one specific organisation, the Medical Research Council, which seems particularly aware of a certain obligation in this area to try to move wherever possible from inventive disclosure to an innovation which is going to be commercially utilisable, and it would seem to me the current management team of the Medical Research Council are very concerned about this particular issue and therefore are most open and very willing to encourage investigations and contacts with organisations like ours, like the British Technology Group and perhaps others. I could name one laboratory, that of the Government Chemist with which we had early discussions on biotechnology. I regret to say for a variety of reasons, none of which are predominant, we did not really achieve a great deal. But I have always taken heart from the fact that, if access to such organisations was made more open, always I think within the bounds of some definition of national security and national interest, and taking the American experience as well into account, this would be a better way perhaps of ensuring that these inventions might get a wider exposure to the commercial marketplace by making them individually responsible for such activities.

652. Did 3i take part in the organisation attempting to exploit defence developments?

(Dr Desforges) No, we did not.

Chairman

653. This questionnaire was obviously very carefully chosen by your good selves. You have investments in 4,000 companies and you contact 218 of them every fortnight, so you must have chosen a particular 218 as having some relevance to innovation, I thought. In paragraph 10 you say, "Only 38 per cent of the sample thought that the climate for innovation had improved over the last five years." Can I go to your table. One-third deteriorated, in the rest of it there was no change. So that, in other words, it seems to me over five years there has been very little change in the atmosphere for innovation. Why is it that innovation in your view is so difficult to get established in this country?

(Mr Kirkpatrick) If I can answer one question first, this survey is the standard number of clients we regularly contact to get their views. It was not specially taken out just for this particular innovation survey. Trying to get innovation into companies is very difficult because, especially at the small- to medium-sized end, those sizes of company cannot afford many mistakes, so they really have to say to themselves if they are going for a project they must



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try and get a lot more right than they get wrong. In other words, the companies themselves start off being slightly risk-averse to innovation for the logical reason that they do not want to take a significant risk and discover that this sinks the rest of the business.

*Lord Gregson*

654. Would you like to have a guess that 50 per cent of your investments in the manufacturing sector, whatever the quantity of your investment is, relate to companies that are innovating and the other 50 per cent are companies that are purely subcontractors? There are a lot of small companies that do nothing but take in other people's washing—the great majority, in fact.

(*Mr Kirkpatrick*) That is true, my Lord. I think it comes down to what you define as being innovation. I have seen some what I would call muck and bullet standard sub-contracting engineering companies who nevertheless are doing some sort of innovation.

655. Let us say companies without any intellectual property rights by your definition.

(*Mr Kirkpatrick*) Not very many, but then what I would tend to say –

656. Would you not say that is one of the problems the UK faces?

(*Mr Kirkpatrick*) No, I think it certainly is a problem but I think our greater problem is actually people not having either the nerve to have a go, even if it is just actually developing something and innovating somebody else's ideas.

657. Are we not really saying the same thing?

(*Mr Kirkpatrick*) I think we are, my Lord, yes.

658. That means they are demanding somebody else's intellectual property rights.

(*Mr Kirkpatrick*) Yes.

659. Of all the small companies we have, how many in effect have anything whatsoever to do with intellectual property rights, their own or somebody else's? It must be quite a small number.

(*Mr Kirkpatrick*) Yes, but if you do not mind, my Lord Chairman, I will give an example of a very small company that was packing day old chickens and they took the idea of the ski-jump on the front of aircraft carriers as the best technology to pack the chickens, because the chickens come along the conveyor belt quite fast and they want to pop them into a box. If they were doing it normally off the end of the conveyor the poor little chicken would go off quite fast; so they put a ski-jump on and it just goes up and pops in. When I saw this and asked about it, they told me the idea came from somebody watching the ski-jump.

660. Did they work out the G forces on the undercarriage, because that is the problem that arises.

(*Mr Kirkpatrick*) I was tempted to ask that, my Lord, but I did not.

Chairman] I do not know if any of you had the opportunity to watch any episodes of the "Trouble-Shooter" series. Sir John Harvey-Jones went round six companies and it struck me that all six were the sort of companies which might approach 3i.

Lord Gregson] They probably have.

*Chairman*

661. Sir John commented on the resistance to change. He made the point you are making in your evidence—management attitudes were absolutely critical to the companies' survival and development. In other words, that was a point of view he was getting over to a very wide audience. It was not a revelation to you in any form, I take it?

(*Mr Kirkpatrick*) Not at all.

662. We have come to the end of our time. Are you optimistic or pessimistic, or do you think they will muddle through in our technological age? With your unrivalled position in our country with 4,000 companies and 40 years' background watching all sorts of start-up situations, how do you see the situation today? Is it a good deal better than it was ten years ago, or 40 years ago when you started, or is the situation more or less the same?

(*Mr Kirkpatrick*) I would say, my Lord Chairman, it is a lot better. There is still a long way to go though. So I think management teams now are a lot more professional, a lot more quick on their feet, a lot more aware of market pressures, but I think they still have perhaps to have a bit more fire in their belly to be really world-competitive at times.

(*Mr Platt*) Can I just make one other comment on that? Again I think I would echo my colleague's increased optimism, not thinking about innovation specifically but just considering the number of people who are wanting to start businesses or buy businesses and turn them round.

Our experience is that there are an increasing number of individuals wanting to do that, individuals who are wanting to leave established companies and established middle management positions in order to seek the independence of running their own business, and we are genuinely finding lots of people wanting to do that, so I would draw great encouragement from that. What sort of businesses they will develop and how innovative they will be is another matter and I think the growth of the venture capital industry, and 3i in particular, in recent years in a way demonstrates that there has been this change in climate.

(*Dr Desforges*) I think you mentioned the potential impact of innovation. If one examines economic trends throughout the world, I believe that

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[Chairman *Contd*]

the crucial problem facing management and, therefore, the management of the companies in whom we invest, is the speed at which they can introduce innovation into their businesses, because this appears to be one of the major distinguishing factors between some of the Japanese successes in manufacturing industry and our own, that is, the speed with which they can move from the laboratory into the marketplace. The management of that process implies certain changes within the structure of manufacturing industry in this country and in maybe other Western European nations in order to achieve this necessary speed because without this I would not be quite so optimistic in general as my colleagues are for our specific portfolio.

*Lord Butterworth*

663. Do you think it is part of your function also to introduce those management techniques?

(*Dr Desforges*) I find that a very difficult question to answer. It is certainly not my direct responsibility as a senior manager within 3i. I would like to think making management more aware of the business of innovation and how to do it would be something we would perhaps introduce rather more by osmosis than by a direct teaching role, but perhaps my colleagues are in a better position to answer that.

Chairman] I think we have run out of time. Can I thank you all very much indeed for coming to see us today and being so helpful with your answers. We are very grateful to you.



*2 May 1990]**[Continued]***Memorandum by British Aerospace**

*Q1 What are the effects of company attitudes and structures (including personnel policies, investment decisions)?*

Successful innovations are usually encouraged and supported by senior management working in a favourable company environment. Managements seeking to optimise profit should be well aware of the advantages and the difficulties associated with innovation. Thus they should respond accordingly and create effective attitudes and appropriate organisational structures. An innovative company is likely to adopt a structure which will foster the effective transfer of technology. Attitudes and structures are also frequently determined by other influences such as the product and the customer base. For instance companies who address major scale customers such as government departments tend to require an innovative top management with a close internal control. On the other hand companies addressing many small scale customers require an innovative low level interface with an incentive driven top level control. There are, of course, a variety of organisations in between.

Though company attitudes and structures may be market driven, innovation is more likely to be influenced by the customer interface and on personal contacts. The implication is, therefore, that personnel policies are an essential ingredient in driving the right innovation processes and these policies need to be closely allied to the type of business the company is in.

*Q2 How active are UK companies in seeking out external technology, especially from overseas? How well do they adopt and apply it.*

UK companies have been rather conservative both in their recognition of the need to acquire technology and in exploiting the range of acquisition options. The choice between in-house or external may be complex, including factors such as the strategic need to control the technology and its future development, the exclusivity of the technology, the effective transfer of the technology, commercial terms and conditions, and accurate costing of the other options. A "not invented here" attitude may also be a factor in the more mature industries. This conservative attitude has in the UK been reinforced by historical developments which have not encouraged companies to look outside for technology.

However, more recently UK companies have begun to be more outward looking and this has been encouraged by collaborative programmes where development costs have been very large and benefits have resulted from risk sharing, e.g., aerospace programmes.

The general impression is that large, especially multi-national, and small high technology companies are most active in seeking external technology. The ability of UK industry to apply external technology in the past may have been inhibited by UK tradition and working practices. More recently the purchase of computer systems with the supporting consultancy tends to be a significant technology transfer mechanism.

BAe is very active in seeking external technology in both the aerospace and motor vehicle fields. Most of this activity is focused on collaborative agreements and is driven by the need to reduce the cost of research and development. On the whole it is proving successful and it is our perception that this collaborative approach is generally increasing.

*Q3 What are the respective roles played by product development and production engineering in technical innovation?*

Both are crucially important for successful technical innovation and are interactive in the manufacture of competitive products. Whereas new ideas are the basis of product development, successful realisation will often require innovative production engineering particularly where new materials are involved.

The relative importance of their roles is to some extent dependent on the maturity of the industry or product. For niche players in high technology areas product development is an essential priority area whereas for a mature product competitive advantage will more likely arise from innovation in the production engineering process.

Traditionally manufacturing industries have adopted a sequential structure to design, development and manufacture. Given a fixed pre-production period, usually defined by marketing and/or financial considerations, this sequential process often gives a design period too short for others than a "get it right first time" approach, and a manufacturing development period which has to absorb any overrun of the design and development stages. With many of the manufacturing processes fixed, and about 80 per cent of the life-time cost committed by the design, the climate for innovation in manufacture is not very favourable. This limited view of containing costs works against the minimisation of life time costs by the judicious use of innovation at all stages.

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By contrast a parallel structure for design, development, and manufacturing development allows for the feed-back of innovation into the critical design phase which controls the greater part of the life-time cost. In BAe this approach is referred to as simultaneous engineering.

*Q4 How effective are the activities of Government departments promoting and supporting innovation?*

The general impression is that the Government, whilst recognising the need for innovation, puts great faith in market forces to provide the incentive. This fails to recognise the scale of the UK problem and the need for the Government to play an influential role in the encouragement of innovation. Too much reliance in market forces results in government withdrawal or at best a narrow support policy.

However, some Government departments are receptive to the need to support technological innovation, and make significant efforts to foster the activity. DTI has had some success in sponsoring innovative ideas in the manufacturing and information technology areas. Their support of emerging IT standards is of major long-term significance to manufacturing industry. The scale and size of the task facing the UK does not seem to have been clearly recognised and the reorganisation of DTI is not helpful in tackling the problems faced by the manufacturing sector.

MOD do not appear to accept that they should play a broad role. All their recent policies are focused on value for immediate money and competition in terms of defence alone and not the health of UK industry. In fact the introduction of overseas suppliers can generate a reverse innovative flow.

NEDO has had some success creating an awareness and in stimulating manufacturing and related activities.

*Q5 What are the effects of City attitudes to investment in innovation?*

The City does not take a strategic view (cf. German Banks) and seems reluctant to take risks in technical innovation. Given freedom of choice the City will invest where money can be made at least perceived risk. The retreat by BES schemes from "innovation" to property is a good example of this in action. The risks and returns associated with property are better understood than those associated with technical innovation.

That the City appears to concentrate on the short term may be simply due to insufficient return from or too great a perceived risk from the more strategic view. Investor expectations in the UK are thought generally to require higher returns, lower perceived risks and earlier payback than in some of our competitor countries.

This simple explanation, however, does hide the need for greater understanding of technology by the public generally and by the City in particular.

*Q6 What is the effect of the legislative and regulatory framework concerning for example labour costs, patent laws, and tax concessions on R&D and the purchase of know-how?*

A high technology, high wage and high GDP economy provides the type of economic climate required for technological innovation. Considerable investment will be required in research, development, capital equipment and training to grow the manufacturing sector and achieve this type of economy in the UK. A strong manufacturing sector providing about 30 per cent GDP is essential for the economic well being of the country and Government should be encouraged to provide clear direction, strong leadership and the framework to promote this.

Manufacturing profitability is less than our competitors and the total level of R&D in the UK is relatively low. There is a need for a better understanding of the relationships with R&D investment, capital investment and effects of the various tax regimes.

Tax concessions on R&D investment, similar to that allowed in Australia would help to encourage innovation in companies.

*Q7 How effective are the mechanisms for technology transfer from HEIs, research councils and public laboratories to manufacturing industry?*

Technology transfer is not a simple process and for it to be successful in an organisation it has to be actively managed. Like many complex processes success is more likely when there is an individual able to champion the process. With such person centered activities a lot depends on the personal contacts and attitudes of the people concerned. Unfortunately UK attitudes have not been as helpful as they might have been. The scale and balance of investment in HEIs in support of engineering and technology needs to be encouraged.



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However, there has been major improvements in recent years. The technical Universities and Polytechnics especially have shown a much greater understanding of the needs of industry. One answer to the problem would be to establish more effective links between these institutions and industry.

BAe has formed links with a number of Universities and Polytechnics, e.g., The North West Consortium of HEIs—Liverpool, Salford, Manchester, UMIST and Lancaster. In the aerospace field BAe has close relations with a number of institutions including Cranfield, Imperial College and Southampton; in motor manufacture special relations exist with Warwick.

MOD Research Establishments have been opened up to industry by the activity of Defence Technology Enterprises ferreting out suitable technologies for licence to industry. Here the need for personal links is recognised and being encouraged.

There is a strong case for encouraging a more co-operative industrial involvement with HEIs which should in turn encourage industry to invest in HEIs and seek a positive return on its money. This has been recognised in promoting the LINK programme but there are many practical difficulties.

*Q8 Does the UK benefit sufficiently from EC support for innovation? How might it be improved?*

UK policy does not fully recognise the importance of R&D for Europe in competition with Japan and the US, nor the strategic role the EC could play. UK industry does not seem to fully understand the potential for, and thus does not benefit as much as it could from EC support. There is significant support available and straightforward procedures for companies' applications. Particularly for medium and smaller companies there is a need for more transparency in EC support arrangements.

*Q9 What are the effects of the varying relationships between companies and their suppliers?*

The traditional relationships of arms length, lowest price trading do not generate an innovative climate. The main drawback with this approach is that it frequently leads to a large base with many small suppliers. Resources are usually not sufficient to build up more than a formal relationship with each supplier and the small suppliers do not have the resources for innovation. This disadvantage is brought home when retrenchment to core businesses as a response to competition demands greater dependence on supplier innovation to provide the compensating competitive edge.

Recognising this many companies, particularly the larger companies are tending to reduce the number of competitive suppliers, to a fewer preferred suppliers with long-term, and sometimes risk sharing contracts. Establishment of long-term contracts with strategic suppliers can lead to technology transfer in both directions which generates mutual confidence and sound relationships.

The large and diverse capability of UK industry to satisfy its primary supplier needs is one of the country's strengths. Whilst the rationalisation of suppliers may weaken this, the evolution of a tiered supply system with strong links to immediate sub-contractors at all levels would reduce the damage, encourage competitiveness between groups and encourage supplier innovation.

*Q10 What factors influence decisions to invest in innovation in the UK or overseas?*

Minimisation of risk is the principal factor and this can result in a preference towards known partners which often means UK partners where investment can be under more direct control and related to corporate strategy. Value for money or unique know-how are the other major factors influencing a decision for an offshore policy.

Government and industrial involvement in European collaborative programmes will through work share arrangements necessitate that significant amounts of R&D will be done overseas. In these circumstances it will be necessary for competitive reasons to be watchful of IPRs and to protect key technologies.

*Q11 In the light of ACOSTS's report "Defence R&D: A National Resource", and the Government's response, is there a satisfactory relationship between the defence and civil sectors?*

The MOD operates research and procurement practices which work towards strengthening the defence technology base but does little for manufacturing technology or efficiency. As noted in the response to Question 4 the MOD does not seem to accept that it should have a role in maintaining the health of UK industry. Government's role in encouraging the wider exploitation of defence technologies should be to create the environment conducive to the transfer of technology and people between the defence and civil sectors.

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[Continued

## Examination of Witnesses

MR I R YATES, Deputy Chief Executive (Engineering), MR J ARNALL, Head of Research and Development, and MR D J STEWART, Head of Engineering Technology, British Aerospace, called in and examined.

*Chairman*

664. Mr Yates, I would like to welcome you and your colleagues today. Would you like to start with an opening statement of any kind?

(*Mr Yates*) Thank you very much indeed, my Lord Chairman. Yes, I would like to say how much I welcome this study, which I think is very timely indeed, not least because of the importance of manufacturing in the UK economy and in particular the central importance of the process of innovation, both to improve products and also manufacturing processes and, indeed, management itself. I am particularly concerned about engineering industries in what might be described as physics-based industry as opposed to process industry and as part of industry at large. I believe in this. I feel, having taken a great interest in this and tried to encourage support, I have achieved quite a lot of support from other industrialists and professional societies and trade associations. As I say, I believe it is extremely timely that we are able to come and discuss this with you today. The attitude that is being taken is that it is very important to try and understand the very complex processes which will interplay and the difficult problems we face are very complex and not very well understood. So that is the first priority. The second is then to see what industry can do by itself and then—and only then, I think—go into a dialogue with the Government to see what can be done where partnership is appropriate. I think in some areas, particularly in education and training, for instance, both industry and Government, and academia, of course, must work together. During this process I first focused on research and development as being a useful way of describing innovation. I think we are now finding and realising the key importance of the skills base and the education and training at all levels of industry from top managers right through. I think now of increasing importance it is evident that the financial mechanisms by which companies are able to fund themselves from equity, from debt or whatever, play a very important and, indeed, an increasingly important part, and it is very important that we understand the studies of international comparisons. I think we should not just look internally but should look across the seas because fundamentally manufacturing industry is competing in a world market where really no holds are barred. I do not want to parody it in one sense but the UK really has not woken up to the fact that our charming English habit of calling things playing fields is somewhat misleading. It is not a game; it is a battle field, a struggle in which I think the economic survival of the country depends on the competitive edge of its economy and the cutting edge really is supplied by high technology and related manufacturing industries. To do that we have been holding a series of seminars and a number of other meetings with

economists and industrialists and, in fact, only this morning in the House of Commons we were able to launch the proceedings of the January workshop.<sup>1</sup>

665. You and your colleagues represent a very successful company. You are right at the forefront of technology, holding your own against world competition. It is very interesting that your Chairman made a speech the other day at the CBI's 25th anniversary which is exactly what this Committee wanted to hear. He said the importance of innovation was paramount and only companies which perpetually brought in successful innovation were going to succeed in the next decade ahead. I imagine you helped to write the speech!

(*Mr Yates*) I did include one or two points. I do recognise them!

666. What is interesting is that you have a marvellous record and yet my impression is that your opening statement was actually a warning?

(*Mr Yates*) Yes, I think it is. I am really not so concerned about the successful industries. One can obviously point to the aerospace industry in the UK as being successful with a very strong trade balance, and we have sustained our world market share over the last 20 or more years. The warning in a sense was to other parts of manufacturing industry and also a warning about a number of trends; for instance, the fact that investment in research and development in the UK has been relatively flat over the last decade and in the competitor countries I would say it has grown significantly. In fact, if you correct the UK R&D for the defence element and make allowance for Frascati and so on, the UK's is close to about 2 per cent. of gross domestic product. Other countries over the decade have been moving up beyond 2.5 towards 3 per cent. of gross domestic product and are growing faster.

667. You were a most valuable witness to the Committee we had on the definition of R&D and we reported not so long ago, and your view and the Government's reply must have clashed very hard. I do not know if you have had a chance to read our report.

(*Mr Yates*) Yes, I am delighted with it.

Chairman] We did take issue in the Committee with certain ministerial statements implying all was well.

*Lord Gregson*

668. Is the reason the aerospace industry is the most successful industry in the world market, which it is, as is the pharmaceuticals industry, the fact that

<sup>1</sup>Note by the witness: Innovation, Investment and Survival: Proceedings of a Workshop at the Institution of Mechanical Engineers.



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both these industries have enjoyed very considerable support from Government, either in the defence field or in the civil field, by launch aid and other funding? It is, in effect, near-market research, which is now declared a no-go area as far as the present Government is concerned. Do you see that as being a negative factor in the future in maintaining your position in world markets?

(Mr Yates) Yes, I think I need to make the point that the aerospace industries in all countries have been to some extent, and most to a very significant extent, supported by their governments. The practice throughout the world on military aviation is, in fact, for governments to support the whole of the development of military aircraft and weapons; indeed, they are primary purchasers. On civil aircraft it is the practice in every country to support the civil aviation industry. It gains part of its research and development by osmosis and transfer from the military sector. The aviation industry is quite good at technology transfer. It also gains from direct support in countries like America. NASA put a great deal of technology support into industry which is very near to market. In this country that has happened through both the MoD and DTI, although the amount of funding has diminished steadily over the years and there is also a special feature which is civil aircraft launch aid. Quite simply, without that over the last few decades, then there would not be, I believe, a civil aviation industry in this country in terms of either aeroplanes or engines. It has had a profound effect because it is long-term patient money which supports the aviation industry which can have to wait between ten to fifteen years for a return on investment after the launch of a programme, and it may have taken five years, or even more, to get to that point.

Chairman

669. At any rate the history of launch aid has been most successful. It has got its money back plus.

(Mr Yates) Indeed, a very great plus. Without it we would not have been able to stay in Airbus Industrie or to have launched other civil aircraft and engines.

Lord Gregson

670. Would this read across other sectors of British manufacturing industry?

(Mr Yates) Is the question, does it read across or could the process read across?

671. It does not.

(Mr Yates) No, it does not. There are others, e.g. the machine tool manufacturers supporting the industry, and these gain from the fact that the industry is healthy, but the process itself does not read across. It has been focused primarily on the engine and air frame manufacturers.

672. Could it read across?

(Mr Yates) It could read across in principle.

673. It has disappeared under so many sectors.

(Mr Yates) Exactly. I believe the process could read across to other specific engineering manufacturing.

674. There is one other factor. It is the one section of aid to industry that the Common Market allows you to make.

(Mr Yates) I believe it is a very powerful process and really worth looking at.

675. It seems rather strange, considering that other countries use it and exploit it within the rules of the Commission, that this is the one country that does not.

(Mr Yates) I think it is something which should be examined. I think clearly it requires administration and at the moment the number of projects which have come up for the DTI, for instance, to examine are being very large, quite specifically defined and, therefore, although difficult, manageable. I think if there are very large numbers of projects coming in that would be seen as a disadvantage, but I believe in principle it is a very powerful method of operating and to be encouraged.

(Mr Arnall) It fills the more obvious gap in many ways in that in the United Kingdom we are reasonably strong in research but it is the very area of development and nearer market investments where we fall down, so those sorts of mechanism would fulfil what actually is a significant gap relative to the competition.

676. You cannot think of anything nearer market than that, can you? What you are really saying is that the present Government's fetish with doing away with near-market aid is really not doing British industry much good at this point in time?

(Mr Yates) I am saying I think launch aid is a very effective mechanism.

Chairman

677. Your industry has a long history of international collaboration and in many respects it has been very successful. Enormously expensive development has made international collaboration even more of a "must". In your written evidence you do sound one or two warning notes about maintaining what you might call the basic know-how in the country and not letting collaboration be a means of passing on essential know-how to countries which would compete. I have in mind particularly Japan, because we have a history with so many items where they start off knowing very little about it, but they are very assiduous learners and assiduous licensees; then they decide to make it a national priority to put enormous resources into a

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wholehearted approach and start to become world leaders. They have done that in selected areas at the present time. They are now interested in the major industrial areas, one of which in this country is very successful being the aerospace industry, and Japan is now showing signs of very considerably increased interest in aerospace. I think you yourself have one or two collaborative arrangements with them. I know Rolls Royce had some collaborative arrangements with them. I know the Americans have agreed with that famous fighter the FSX to a lot more manufacturing being undertaken in Japan, to get more technology transfer. So all the signs would seem to be that they are in the early stages of a massive transfer possibly of today's technology to Japan, and on past record Japan will then take this technology, improve it and become a very serious competitor indeed. Is this something which concerns you?

(Mr Yates) My Lord Chairman, the process does. The facts are that, if you are collaborating wholeheartedly, as one has to do in these high technology projects, there is almost total technology transfer between the partners. Indeed, on a number of programmes, particularly military ones like the new European fighter, it is almost a precondition that certain countries, like Italy and Spain, our partners, get the technology transfer. Indeed, the German aviation industry since the war has used the same process to build itself up. This does not matter too much provided one can maintain the investment for the next project. It is rather like saying you do not mind sharing yesterday afternoon's technology provided you keep your hands on this morning's. That has always been my own guiding light. The danger which I mentioned about reduction in the function of research and development is that we cannot keep our technological edge and, indeed, that is really the danger. In relation to Japan, the aerospace industry in this country does not have many direct links—Rolls Royce has more—but the process is without any doubt at all at work and they could and will become very major competitors within the next decade.

678. There is a theme running through many submissions we have had that we are coming up against a manpower limitation now—very innovative, skilled manpower. Is this going to be a limitation to British Aerospace?

(Mr Yates) Yes, I think it is going to be a limitation to everyone. In simple terms I think it is a cultural problem which makes it difficult to attract people to manufacturing industry. The aerospace industry seems to be able to avoid the worst of that because its image is not that of a smokestack industry, one can relate to flying in aircraft or test pilots and so on. So we do not today have a problem in attracting enough graduates, nor do we at the moment appear to have a major problem in attracting a number of skilled people who have been through an apprenticeship, although in the nation as

a whole only about one-third are now coming forward as skilled apprentices as they were in the 1970s, so potentially there is a problem. The biggest shortage of all is really in the technician area where there is an acute shortage—I think it will get increasingly short—and in particular I think that impacts on the graduate population because there is a tendency to use graduates because we are short of technicians where technicians should be doing the job. That tends to demotivate graduates and increases their propensity to leave.

679. Whereas in that area in Japan graduates are used much more as technicians than they are in this country.

(Mr Yates) I dare say, but if you look at the output of competitor countries one can see the problem.

680. There is a far bigger pool.

(Mr Yates) There is a larger pool but, apart from the fact that we perhaps compare on a population basis, we have roughly about half the number of graduates of these other countries, Germany or Japan, but we have something like a third or a quarter of the number of technicians. We are lagging badly in terms of craftsmen.

681. What are you doing as a company to counteract that?

(Mr Yates) We are doing a great deal in terms of training and education. We are setting up a number of initiatives with the higher education institutions, adopting a policy which can sometimes be referred to as regionalisation, and where we have a large sector of manufacturing, for instance in the North-West, where we have a total of nearly 20,000 people, we are working with a whole range of institutions, polytechnics and universities, and together working out interfaces, trying to encourage the use of science parks for external interfaces with other companies, and also working very hard on interviews with the schools, which is really the core of the problem. One of the major problems in the 1990s is going to be an increasingly short supply of engineers, particularly fed by a lack of pupils coming forward to engineering, poor teaching of mathematics and physics.

Lord Butterworth

682. I have often thought one of the problems is getting the interest of young people at school in manufacturing industry and there comes a point when the interest crystallises in some way and they go off to be whatever they are going to be? How do you get schoolchildren interested in manufacturing industry?

(Mr Stewart) One of the processes is to bring the children into the industry through plant visits and work experience placements. This is particularly so



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within Rover Motor Cars, who in fact did rather better than we did on the aerospace side, through their Education Partnership Programme. So this brings them in contact and there is a dialogue which then develops between the industry, its trainers, engineers, and the local schools. The object is to improve the image of the engineer and to encourage the local schools to have a closer relationship with the industry. So that is the way it is developing and the Engineering Council, for instance, are doing a great deal in this direction.

*Lord Clitheroe*

683. It relates to glamour and excitement?

(*Mr Stewart*) I think it is image. In the past manufacturing in particular has had a rather bad image in this country. It is slowly improving and I think industry has a lot to do in the future to train schoolchildren that all is not "grime and dirt" within manufacturing.

*Lord Butterworth*

684. When you get the children there do you ask whether they would like to have a career in industry?

(*Mr Stewart*) I have not, obviously, been greatly involved but yes, what you are trying to do is to influence them.

685. I am wondering what sort of answers you get?

(*Mr Yates*) I think it varies actually. Sometimes it is very enthusiastic, sometimes great surprise that it is so interesting, and in other cases you always have some things where people are turned off.

686. At all levels do you think you get your appropriate share or fair share of people leaving?

(*Mr Stewart*) We do very well at every level. Last year we recruited about 1150 graduates into British Aerospace mostly into the engineering function.

*Lord Gregson*

687. Does the industry get its fair share of graduate people going out into graduate engineering?

(*Mr Yates*) I think the answer has to be no. You have only to look at the declining number going into engineering. Whether you rate their abilities by the A-level passes, for instance, it is very worrying, but particularly you find some of the more able engineers when they are qualified do not actually then go into engineering.

*Chairman*

688. Compared with many industries aerospace is very glamorous and it is rather thrilling to go round an assembly unit in any large factory in the industry. If anyone saw some of the industrial

backgrounds in the recent Harvey-Jones series, it was enough to put youngsters off for life, where you have girls soldering plates like a robot, having been doing it for 13 years, and the motor car assembly line where the chap has been doing the same bit of chassis with a simple blow-torch for 31 years. If we are going to have a different image, do you not think companies like yours should try and get yourselves much more known in the schools with more videos and much more promotion? If you take the Hubble telescope, the most fascinating thing that has happened for a long time, the sort of thing that captures the imagination of most people, you provided the solar panels. It is the most marvellous story but unless you read the technical magazines no-one will know anything about it at all.

(*Mr Stewart*) But we have locally between the company and the schools a very good dialogue. I do not think there is any doubt that as an industry we are doing a great deal in this respect. I accept that we could do a lot more.

689. Do you make videos for schools?

(*Mr Stewart*) Yes, we have been very supportive of videos. We have been supportive of the video series called "Electronics Now" and we have had special event days in which we brought busloads of children into our sites to witness this and see the products we are developing. We are now funding a new series called "Wealth from Science and Engineering". So yes, we play a large part in projecting the image of engineering into the schools, the good image of engineering.

(*Mr Yates*) I think I should also explain that we operate at several levels. It is not just the children; one needs to get at the school teachers, and ideally the parents, and one needs to try and get at the careers master, if there is such a person, which is rare, unfortunately. For instance, at the national level the SBAC just prior to the Farnborough Air Show brings down 100-and-some teachers from all over the country, puts them up in Surrey University, gives them lectures about aerospace, the whole of the industry, and I, as past President, am addressing them this year. We give them a talk and take them to the show the next day.

*Lord Butterworth*

690. Do you see any future in trying to improve the career of the engineer, making it a better career? Are there any changes one ought to make in engineering to improve it as a profession, to make it more attractive? Let me give you an example. Some two or three years ago I went round a computer division in Austin and almost all the engineers there were women; the place was full of women engineers. That is not the kind of image one has of engineering in this country. It is a very different career in the States to what it is here. What can we do to improve the profession of engineering?

(*Mr Yates*) We have to do a great deal. The major problem we have is the cultural problem, which

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really starts in the family and in the school, and to get across the sheer excitement, the intellectual challenge which is in engineering. It is very difficult, I believe, because in most of the media programmes to which they are exposed they see nothing of this really. If only one could get "East Enders" or something to be more about aircraft or about engineering and a few things of this sort, they might take it in automatically, but there is virtually nothing.

*Lord Gregson*

691. We did have a programme called "The Plane Makers", which I think did more harm than good.

(*Mr Yates*) I think so. Unless you end up doing something funny with somebody else's wife it does not seem to attract people!

*Chairman*

692. You have a marvellous record and make a marvellous contribution to the balance of payments. The odd thing is that the public perception of British Aerospace does not seem to me to match its achievements. When British Aerospace is discussed in the financial columns it is never put forward as the jewel in the crown, never noticed, and yet your achievements are really quite remarkable. We all the time accentuate the negative in this country, yet we do have some amazing success stories. What is the dilemma in getting over its story and getting the public to appreciate it?

(*Mr Yates*) Perhaps we are talking about several types of public. I believe to the man or woman in the street or on the Clapham omnibus the image of British Aerospace is probably far better than it was a decade ago when, in fact, one of the predecessor companies, the British Aircraft Corporation, did not publicise its activities. We did not believe in any significant publicity, so I think in that sense it has changed.

Equally the company is very large and in many ways close to government and therefore, I suppose, open to criticism for any political reasons which might arise; it is therefore more exposed than a smaller company. It is therefore more likely to be the butt of any criticism or feelings that the press want to say something about. On the other hand, if you come to the City and the financial press, we do get a fair hearing; but there again they have a different set of ratings really, advising people who are investing, and their view perhaps relates to the performance of the company over the immediate past few months or immediate events whereas basically as a company one is talking about investment over five, ten, fifteen years. That really is not news to many people.

*Lord Gregson*

693. Media representation of manufacturing engineering, including British Aerospace, is merely a manifestation of the culture problem that we have.

(*Mr Yates*) I believe so. It reflects the whole attitude, I think, of both the media and the public at large.

*Lord Erroll of Hale*

694. Could I put another point of view? In talking about innovation in manufacturing industry one wants to distinguish surely between research and development and design projects and innovation in production methods. It is quite a different type of innovation. I think we have been concentrating more on the design side of new products and not perhaps giving enough attention to the importance of improving or innovating in manufacturing methods. I am just wondering if you would agree with this or have you any views on this aspect of innovation?

(*Mr Yates*) I think we all agree entirely that your emphasis today is very important indeed, and again it is something which in the aerospace industry over the last few years we have been able to address with increasing confidence. If you look back a decade or two we could not necessarily look forward to a long production run. If you were just making aircraft for a few years it really did not warrant investment in getting the production costs down. The advent of the collaborative programmes like Tornado and Airbus allowed us to address this problem. Knowing you have security of production over several years, you can make the investment, and we have made dramatic improvements in the cost base of the company as a result. It is one of our top priorities and must continue to be so. I think the route to success basically is to increase the profitability by improving the cost base, by improving the technology of manufacturing.

695. The engineers you recruit need not know very much about aeronautics, they want to have a different type of background knowledge of production methods which bears little relation actually to the science of aeronautics.

(*Mr Yates*) Exactly. We certainly do not exclusively recruit aero-dynamicists or aeronautical engineers, but mechanical and production engineers, but incidentally you do not really have to be a totally dedicated professional engineer to understand some of these processes, to be able to manage them. This is really where it is possible to train people up to be very effective and to support technicians in these processes, and a lot of the improvement you get is actually from the way you organise things, not just from the technology you apply to the job.

*Chairman*

696. I thought your statement was very clear on that. You are now running this parallel structure, and that is extremely helpful.



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(Mr Stewart) The university system has responded in development of graduate schemes such as the Integrated Graduate Development Scheme at Warwick University in Manufacturing Systems Engineering, so those schemes are providing the sort of people you have just referred to.

Lord Clitheroe

697. To what extent do you think UK manufacturers involve potential customers adequately in the innovation process, and to what extent do you yourselves see that as the driving force?

(Mr Yates) I think it is very important indeed. As far as we are concerned we involve the customers in all our products. On the military side, of course, there is very long and strong involvement with the Ministry of Defence and collaborative partners, governments, in defining what is required. On the civil aircraft side it is the same. They take a long time discussing with the airlines just what they want. On the automotive side it is precisely the same, but in this case it is really with representatives of customers, not the individuals themselves, but with all those who will market the car, and there is a great deal of market research done and so on. I think that is absolutely essential. Precisely where it is done in the company depends on the customer. With a large number of customers it is done on the periphery of some of our companies, or it is done centrally if it is a very large military programme.

698. Do you see that innovation in general is more strongly driven by customer requirements than it is by invention?

(Mr Yates) It is difficult to say really because inventions come out of manufacturing industry, because really that is the source of innovation, and that then goes into the rest of society normally. I think customers respond to those inventions and it is difficult to know whether one is in a sense due to the complex interaction responding to what the customer wants or whether he is responding to what he thinks one can do. It gets very difficult to differentiate between the two. I think sometimes an interface is so close it is difficult to know where it comes. There are examples obviously where it has been possible to put an idea forward which has been a step change. If you take the jet airliner, that is a classic example of it—the swept wings; then you just radically change the whole of the market.

(Mr Arnall) I think the technology planning of our companies has both push and pull aspects which are clearly recognised. Yes, there is clearly a market pull as a result of what the customer wants in terms of development of the current product range and nearer term products. Certainly that is a very strong influence on the technology plans and investments we make. But equally there is the push from the science and the engineering itself, in the other direction, to present new opportunities which customers might not realise are there.

699. It always seems to me that we have the problem that in the one case they are quite good at inventing things but not very good sometimes at developing them and selling them to the customer, and on the other side we are not perhaps as good (I am not talking about your marvellous companies) or many companies are not perhaps quite as good at being close to their customers and, in fact, receiving that input into their business. So I am not really asking you about British Aerospace but about your perception of industry in general in this country. Is part of this lack of innovation a failure to respond in the right way with the customer?

(Mr Yates) Yes, I would not like to say what proportion, but undoubtedly what you say must be right for a significant number of companies. I think one of the interesting customer interfaces is that of the smaller companies with the large ones. It is essential for the large company to be quite clear about what it wants and if the small company cannot produce the quality on time then they are bound to go somewhere else. You should not put up with a fudged situation. I think small companies, indeed all companies, have to recognise the customer's right and they really must respond to it.

700. Do you follow Ford's approach of quality, picking your suppliers and requiring them to match a certain quality, and then you qualify them?

(Mr Yates) Yes. I would not say we follow Ford's approach, if I may say so, in the aerospace side. You have a very clear safety and quality requirement which has to be there; you have to qualify all the supplies, there is no question about that. On the automotive and other side, quality standards are set and they are very, very positive and have to be followed. Indeed, quality now is one of the hallmarks of the Rover Group of cars without any doubt. It has to be a leading standard, it cannot just be a follower. It has to be quality standards which are up with the very best.

Lord Gregson

701. Would you not say the US approach or the Japanese approach of helping the subcontractors to achieve quality standards is better than beating them around the head, which has tended to be the Ford technique?

(Mr Yates) I believe so. I always have believed that to be the right way. You have to be quite clear about the interface between you, that assisting suppliers is in your own interest. Indeed, it is interesting that we have done this but, for instance, Boeing are happy to hand over manufacturing technology to a supplier, knowing it will get their costs down, your price will come down and you both benefit. I think this is a very new approach, rather than haggling, trying to get one-tenth of a penny off a door handle for a car, but it does lead to a long-term strategic relationship between the main

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company and its suppliers, which has to be carefully watched, but properly nurtured, that is to the benefit of both.

Chairman

702. Reverting to the Japanese success, one of the things they have been going into in the last two or three years is trying to minimise the number of components in an assembly. They have managed to get more and more design changes so that the number of components required to make TV sets, for instance, has dropped by 40-50 per cent. in the last five years. In all sorts of areas they are striving for redesign so that the number of components goes down. The new components may be more complex but then you lower the costs and get greater reliability and so on. Are there similar developments taking place in the aerospace industry?

(Mr Yates) Without any doubt, yes. There always used to be an edict, even in the 1930s, called, I think, "simplicate and add more lightness". What it really means is that you try and have the simplest possible airframe or engine you can, and we are now able, through modern processes—for instance fabrication using titanium, where you can actually super-plastically form it and diffusion bond it—to produce a very complex component out of one piece in one manufacturing process, where you had lots of pieces and lots of rivets before. That has reliability and improvement in cost.

703. It represents innovation but does not get called innovation?

(Mr Yates) Yes.

(Mr Stewart) We would call it innovative manufacturing.

704. Maybe we are good at that type of innovation whilst criticising ourselves for not being so strong on innovative research and development?

(Mr Stewart) I think you are quite right. We tend to develop these things and refer to them as innovations but very significant improvements have been made in recent years.

705. But this is half the battle really and if only we could be let loose in the pottery works I am sure we could improve their production methods very substantially?

(Mr Stewart) Yes.

Lord Gregson

706. I wonder whether we might look more directly at the fundamental problem facing us. It is very obvious from the trade figures and our place now in the world trade situation, which has dropped quite alarmingly in the last ten to 15 years, that we

are facing a crisis, as you said yourself. Manufacturing industry is so important to our future, in which case what do you think are the main root causes of our decline and failure in manufacturing industry?

(Mr Yates) I believe it must be a failure basically to innovate and invest. I believe we are quite good at ideas but innovation is making things happen and it has to be backed by investment over a long period of time before you get the results and get a payback for that. If you look at the history of manufacturing industry since the war, for instance, you will notice there is a lower level of investment in research and development, if that is the proxy for innovation, a lower level of investment in capital for manufacturing equipment and so on and a lower level of investment in raising the skills level of the workforce and in training than in nearly any other competitor country. I believe it is this failure to recognise the importance of investment. It could be that it is not just a failure of individual firms to recognise the importance but the facts are that nearly all investment is made out of retained profits and if you are not sufficiently profitable, for whatever reason—it could be due to lack of prior investment, for instance, or other factors such as the cost of borrowing or the cost of equity financing or through lack of a skilled workforce—you do not make the profits, you cannot borrow to re-invest and if you are a publicly quoted company you have to satisfy your shareholders.

707. Who is at fault? The Secretary of State for the Treasury in America says it is the shareholders who are at fault; the shareholders think too short term and they are not encouraging industry to invest. We have had the comment from a number of witnesses who said it is British management; it is very poor and, therefore, does not encourage the City to invest. Who is at fault, do you think, in this situation?

(Mr Yates) I am reluctant to use the word "fault" because I find it difficult to see why people behave in the way they do. I do know if I were in the City I would behave precisely the same as anybody else, given the terms within which they operate.

708. It is not happening, is it?

(Mr Yates) No, it is not, and I think we need to spend a lot of time thinking about this. As it happens, last night I was talking to the NEDO Finance and Economics Committee, and put forward a paper which surprised some of us. There was complete agreement from those around, which included industrialists and economists and also some bankers and people from the other parts of the City, and on the face of it it appears that companies are not very highly rated by investors.

709. Does that mean managements are not highly rated?



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[Continued

[Lord Gregson *Contd*]

(*Mr Yates*) Whatever the reason, they are not highly rated as a success in that sense but the dividend pay-out ratio happens to be quite high in this country. We know the cost of borrowing is high. Whether other management would be able to cope with these more stringent parameters, however good it is, I frankly doubt. I have the feeling even some of the world-class companies would not do any better than our best companies, given the environment in which we operate; in other words, I think our top management is very good. There are other factors we need to understand.

Chairman

710. Could we see the paper to which you have just referred?

(*Mr Yates*) It is a NEDO paper. I will certainly ask the Director if he could let you see it.

Lord Gregson

711. What you are describing is a vicious circle?  
(*Mr Yates*) I believe so, yes.

712. How do we break it? Is that not the real key to the problem?

(*Mr Yates*) I think it is the nub of the whole problem really and it is not easy to see how you break it, given that there is a cultural situation in relation to manufacturing, as we have talked about, and that same cultural process really seems to relate to the form of capitalism in which we operate basically.

713. In Japan the Prime Minister has another job; he chairs the Technology Advisory Council, and last time we visited him he told us in effect that he considered his job as the Chairman of the Technology Advisory Council as important as his job as Prime Minister because that is the secret of Japan's success. Do you not think it needs the Prime Minister to stamp on this with great authority to break the circle? Is there anybody else who could do it?

(*Mr Yates*) I think, if I may, a simple answer to the question might suggest that I would believe there is a simple answer to the whole problem. I believe there are many differences between ourselves and not only Japan, which perhaps is the most extreme example, but also the United States which is the closest to us in the financing mechanisms and, indeed, has some of the problems which we have, perhaps in a slightly less extreme form.

Lord Gregson] The Secretary of the Treasury said only one country was worse than America and that was Great Britain.

Lord Clitheroe] Australia.

Lord Gregson

714. That is what he said.

(*Mr Yates*) I was really thinking of closer to home in trying to compare with Germany which is basically very close to us. France, Italy and Spain are slightly different; a lot of their industry is actually government-owned or directed by government in some way. But I believe an interesting comparison is Germany. We should, as I said earlier, try and make these comparisons because I think they can be very illuminating.

Chairman

715. Has there been a large change in the last three or four years? There was the Government statement in the early 1980s, with the Chancellor of the Exchequer saying manufacturing industry had had its day in this country and it did not matter. One reaction of the Select Committee under Lord Aldington which reported five years ago was to make gloomy predictions, which unfortunately came right. In recent years Sir Geoffrey Howe and Mr Major have placed emphasis on the importance of manufacturing industry. I think it is fair to say we as a Committee could not agree more with the comment that a strong manufacturing sector providing about 30 per cent of GDP is essential to the economic well-being of this country. Having lost so much ground, to regain it is going to be difficult. One of the problems we come up against is that while in many ways the export performance of the country is extremely good—the Government points out that per capita we export twice as much as the Japanese—we import a lot of things we could easily make ourselves and were making ourselves. The problem really is, as our bigger companies get more and more global, a lot of their investment is going to go overseas. If you saw the ICI statement in this morning's papers, for instance, because of the growth of the Pacific Rim investment is £100 million in Japan, £200 million in Taiwan and so on. I was up on Teeside a month or so ago and there is an enormous plant there to make TPA acid which is slightly long in the tooth now, so I asked about what they were going to do to replace it and they said they were putting up a huge one twice the size in Taiwan. So we are going to get a situation where the multi-nationals do very well, ICI does very well but the trend of investment seems to be moving overseas. We have income from insurance companies and so on; but, if you look at the companies they invest in, figures produced the other day show that investment by all the institutions in British equities last year was a good deal less than the investment in overseas equities. So you get a slight feeling that the underlying trend is going against us. We have got this record of invention, we have a record of quite reasonable innovation as has been pointed out, but when you get down to the marketplace and establishing a world manufacturing position, that is now in fewer and fewer hands, of which you are one.

2 May 1990]

MR I R YATES, MR J ARNALL  
and MR D J STEWART

[Continued]

[Chairman Contd]

We have got this great example of the pharmaceutical industry with its great success; on the other hand, the balance of payments on chemicals which was formerly favourable is now moving downwards and has been for the last five years. Although we still export about £12 billion worth of chemicals, we are importing £10 billion worth, and a surplus is emerging quite rapidly. This is one of the things that has concerned the Committee very much. We are trying to find out where we will have new growth areas which will enable us to close the gap because even in areas where we are doing very well the lead is diminishing. Therefore, something else must come up to take its place. The obvious conclusion would be to restart the textile industry making certain consumer goods, unless the Japanese come to do it first, but it is going to be very difficult. It has happened with television sets. The turn round may come from people like the Japanese coming here and making white goods and other things which we are now importing. That would seem to be a matter of superior management skills more than anything else.

(Mr Yates) Could I comment on two aspects? I agree with the concern and it is necessary to make a distinction between a British company, if you like, quoted on the stock market with an obvious British image which does its work here, and in fact there could well be a tendency for manufacturing within British quoted companies to migrate overseas, either to more favourable areas or because they see they need to become global players, or because of partnerships with Europe. For those reasons—the latter one in particular—we need to see what are the inducements, what are the environments in which they set up these new plants, whether they are more favourable than those in the United Kingdom. It is quite clear that a business decision has to be made because the board of a company is accountable to its shareholders and they want a return on investment. The board are not there to manufacture in the United Kingdom. So there is a distinction between British quoted companies and where they do their business; I think that is one point.

Lord Erroll of Hale

716. Surely a factor we should remember is that, once the manufacturing facility is set up overseas, the dividend will flow back to this country which will help to redress the adverse balance of payments.

(Mr Yates) Yes, but only a fraction of the balance of payments benefit you would have had, had the work been done in this country.

717. A fraction can be nine-tenths of the whole.

(Mr Yates) A dividend of nine-tenths is a lot of profit! If you export from this country you get 100 per cent of that export. If it is only a dividend on work done, it is a fraction of that.

718. But you have not got to buy the raw materials to make the export article.

(Mr Yates) No, agreed. They have to do the calculations but basically I think there is no direct substitute for having manufacturing as part of the gross domestic product on the base.

Lord Whaddon

719. Of course, we end up by importing the goods made abroad.

(Mr Yates) Exactly. So the trade balance would suffer although company performance was apparently improved.

Lord Gregson

720. Not only the trade balance, the standard of living that goes with it as well.

(Mr Yates) That is the other point, the macro-economic effects. This is the point about having a significant fraction of the gross domestic product in the tradeable sector in manufacturing.

Chairman

721. You are in the motor trade as well as aerospace, you own Rover now. You had a situation in the 1970s of making 2 million cars, it went down to less than a million—850,000—a few years ago, and now it is about 1,250,000 to 1,300,000. What is interesting is that all motor car companies are now profitable. Honda is making good profits. Rover is making profits. You have Honda here, you have Nissan here. Toyota is coming. So you are seeing an industry which is responsible for 6 billions on the balance of payments showing signs of renaissance. To a certain extent that has been led by foreign manufacturers. Is there not a hope, therefore, that we will re-establish our situation even in textiles if the Japanese start investing in textiles in this country and bring in superior management? One of our drawbacks is that our management skills have fallen behind those of our competitors.

(Mr Yates) I did not answer the rest of your prior question, which I think is on a similar basis. It is probably true that management skills have been less, maybe to an extent are less, but I believe we have improved enormously over the last few years. It is most certainly very clear to me that by international collaboration on the aerospace side we have seen the best practice in the world and we have been able to emulate it. I think precisely the same process is taking place with Honda and Rover. The results are dramatic, as you can see. The other point, of course, is that companies coming into this country on a "greenfield" site may well find that they have inducements or situations which are particularly favourable to them, and it is anecdotal—I forget who said it, but I was told it last week—that one senior manager said "If I had the same basis as they did we too would be extremely profitable". Indeed, it is much more difficult sometimes to turn round an existing industry and make it profitable than to go into a greenfield site.



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MR I R YATES, MR J ARNALL  
and MR D J STEWART

[Continued

[Chairman Contd]

722. It can be done. One example which we saw a year ago was the turn round which the Japanese made of Dunlop—the same site, the same factory, the same machinery.

(Mr Yates) I am not saying it cannot be done. I was not meaning it cannot be done, I was meaning in many cases it might be easier.

723. It is a matter of comparing the evident inducements for making the investment in this country, which is welcome on a trade balance basis.

But we have got these very adverse balance of payments figures at the moment. Do you think there is a real chance, given that you have better management, better-paid management and less complex management, that the 1990s will see a turn-up?

(Mr Yates) We think we will see a turn-up and most economic forecasting suggests there will be some turn-up. The difficulty I find myself in is whether that rate of turn-up is going to be sufficient to enable us to grow the whole economy without running into a trade balance problem again, and I think we need to grow the manufacturing sector more rapidly than it would grow naturally left to itself.

724. The Government's attitude has changed on that, without a shadow of doubt, and if there is a change of government they have pledged to give more industrial support and so on. The Government is still as it were giving less direct support to industry than it was. Do you feel—and it comes out in your submission—there is still a long way to go for

government departments to come to terms with new situations? You have argued in the past that the money was profitably used but with greater expertise, greater experience, do you think we could more usefully direct Government aid? I can see Mr Arnall is agreeing.

(Mr Arnall) Totally.

(Mr Yates) I think the answer really is yes, it is possible, without any doubt, to achieve a very efficient and much larger manufacturing base but it has to be seen as a priority and not just left to normal market forces, which do take a very long time to operate.

725. Some of the great gurus of the present Government are now saying market forces themselves are not sufficient; there has to be a change. It is a long way from going to the other extreme of saying market forces do not come into it at all. One of the results of the alteration is that now market forces have a great deal to answer for. Do you think the pendulum will swing back?

(Mr Yates) I think it will do, but slowly, and it needs a positive push in the right direction.

726. And it is your advice that when we write our report we should give it a strong push?

(Mr Yates) I think that is the bottom line. We need to find the best way of doing it.

Chairman] We are very much indebted to you, Mr Yates, Mr Stewart and Mr Arnall, for your help. It is always very stimulating to talk to people as successful as yourselves. Thank you very much.





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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 9 May 1990

**CELLTECH**

*Mr G Fairtlough*

**EUROTHERM INTERNATIONAL**

*Dr J L Leonard*

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WEDNESDAY 9 MAY 1990

Present:

Butterworth, L.	Gregson, L.
Caldecote, V. (Chairman)	Kearton, L.
Chapple, L.	Taylor of Gryfe, L.
Chorley, L.	Vinson, L.
Clitheroe, L.	

**Memorandum by Celltech**

**Q1** *What are the effects of company attitudes and structures?*

In my experience company attitudes and structures are easily the most important influences on innovation in manufacturing industry.

Innovation, being concerned with economically significant application of new knowledge or techniques, requires contributions both from those who can judge the best opportunities for application and the resulting economic viability of an innovation and from those who are keenly aware of new basic knowledge and of new techniques. Innovation, therefore, usually occurs when there is intense interaction between knowledgeable people sharing a common purpose. At my company, Celltech Limited, we have tried very hard to create the right conditions for this intensive interaction.

***Project Management***

As promising products or processes emerge they have to be managed so that they move rapidly to commercial application and in a way which ensures high standards of quality and reliability. The main way this is achieved is by good project management, which also has to ensure that if a project is failing to meet its targets it is terminated.

At Celltech we have developed a staged approach to project management. The early stages depend almost entirely on individuals with a sometimes fanatical dedication to a potential innovation. These champions are given as much help and encouragement as possible at this stage. Our rule is: everyone must provide three good reasons to support a new idea before earning the right to be critical. But once the idea has reached the point of needing significant resource it has to pass through a "decision gate". This is a review by an expert panel which decides whether the idea is good enough to be worked up into a fully defined project. If it is, it becomes a "candidate".

A resource management group helps in the process by working out how many people and how much money and equipment will be needed to take the project through the various stages and by proposing how they can be provided (for example by stopping a current less promising project).

Our project management approach can be pictured thus:

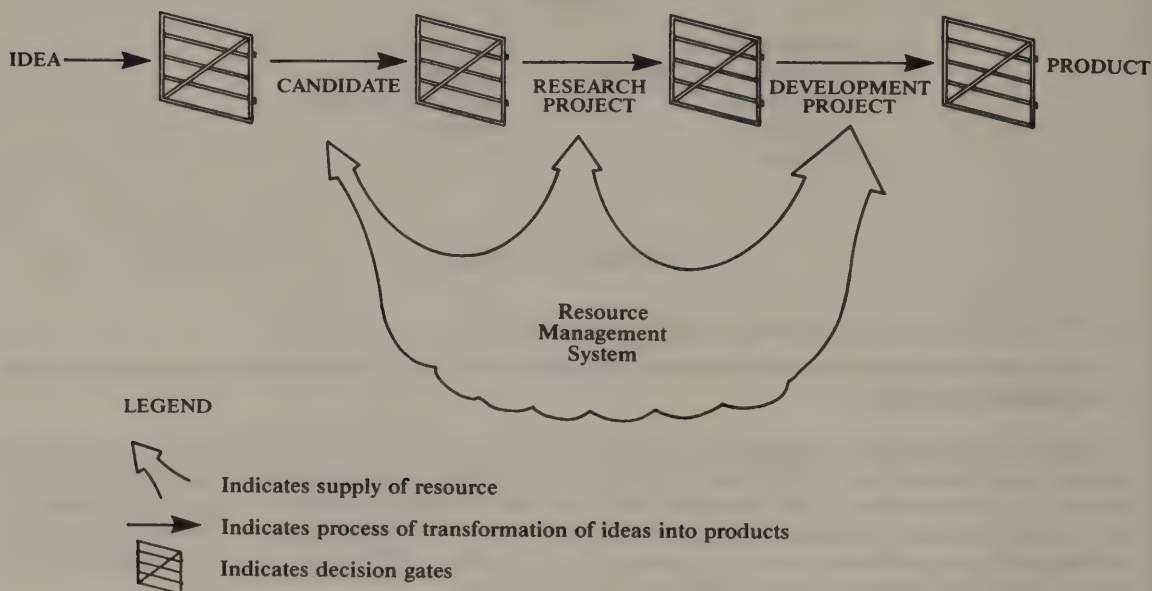
<i>Stage</i>	<i>Person Responsible</i>
Idea	(Self-appointed) Idea Champion*
Candidate	Candidate Champion*
Research Project	Research Project Manager
Development Project	Development Project Manager
Product	Product Manager

\*Part-time responsibilities.



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[Continued



### Decision Gates

#### Internal Communications

(This section is adapted from an academic study of Celltech. "Celltech: The First Ten Years of a Biotechnology Company" by Mark Dodgson, Science Policy Research Unit, University of Sussex, February 1990).

Celltech is a knowledge-intensive company—labour costs in 1988 were 38 per cent of sales—and good communications and information flow are essential to its effective operation. A major facet of Celltech's strategy towards its employees is the encouragement of communications within the company. I have a number of strongly-held views on the importance of good organisation and communications as a mechanism for improving innovation. Key amongst these is the concept of 'compartmentation', a term from cellular biology which describes the partial closure from the environment which allows multi-order feedback to develop between the components of a system. A number of features of cells are attractive to organisational structures in firms:

- they are largely self-contained and are densely organised for intensive internal communication
- at the same time, they constantly communicate with other cells in a complex networking system
- despite their diversity, all cells live by rigid rules of competition and co-operation set by the larger cellular framework
- cells are continually evolving. New molecules emerge, new reactions are attempted, new relationships are assessed and either adopted or discarded. In such trial and error, however, only those relationships that promote the well-being of both the cell and the host organism are permanently integrated into the cellular life.

Analogising from cells to organisational structures, three areas are important when considering the best mechanisms for inducing good internal communications within a compartment. The first is architecture—the physical environment of buildings and layout, which can be structured to assist communications. The second is climate—the ethos and morale of an organisation. A climate conducive to innovation can be attained by openness and respect for individuals (these aspects are considered to require the greatest effort to inaugurate and maintain). The third is systems—methods for consultation and direction of effort. These are more readily designed effectively, and accepted, if the organisation's architecture and climate are correct.

Continuing the cellular analogy, cells do not exist in isolation, and communicate intensively, organisational compartments should do the same. Compartments should put great effort into spanning their boundaries, actively seeking knowledge from outside. Also important for organisations as well as for cells is awareness of the contribution of compartments to the greater whole. Compartments' contributions have to be validated and, if found lacking may be discontinued.

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[Continued

These policies are realised in practice through a mixture of formal and informal mechanisms. The formal mechanism for employee representation in Celltech is a Staff Council. This body includes 14 representatives *elected* by the staff in a geographical area within the company (which now operates in five buildings). In 1986 the Staff Council was asked to propose ways of keeping good communication between management and staff as the company grew and to consider a representative attending Management Committee meetings. The view of the Staff Council was that there was little point attending the management meetings as anything of concern to the Staff Council would inevitably be communicated to them through other channels. Peter Nicholls, Personnel Manager, believes the Staff Council to be an effective means of communication and representation, and that it has been responsible for introducing a number of changes in the company.

One particular facility designed to improve communications within the company lies in its new R & D building (architecture). In this building is an extended meeting area, where staff can congregate at any time of day. It always appears well used. The company cafeteria in the same building is another venue for encouraging communications. It is always well attended (which is unsurprising given the excellence of the food and the high level of subsidy). A variety of other prandial communication methods are used. All new company recruits are introduced to the "strategy group" of senior managers at a drinks party, and there are often informal dinners organised following the completion of training courses. Dinners are arranged for managers Grade 8 and above to which their wives or husbands are invited.

The company has an extensive seminar programme, with both internal and external speakers. During the course of a year there are around 50 seminars given by Celltech staff and another 50 are given by invited external experts (boundary spanning). There are also a range of intra- and inter-functional discussions and meetings. In the Manufacturing function, for example, there is a weekly managers' meeting and a monthly meeting for all Manufacturing staff. The latter is frequently well-attended, and may on occasion include a presentation from someone from another function, for example, on a new R & D project. Additionally, there are monthly liaison meetings between Manufacturing and Development and Manufacturing and Sales and Marketing.

In addition to these formal mechanisms, there is a great amount of informal communication within the company. Senior managers spend a significant proportion of their time talking to managers, scientists and other staff. To an extent this is formalised, for example, in 'management lunches' organised monthly by executive directors for all management staff, but there are numerous informal opportunities for discussions. The practices whereby managers devote considerable effort to knowing their staff are seen to be genuinely believed in, and effectively used, by the senior Directors. David Gratton, Chief Operating Officer, for example spends a significant proportion of his time dealing with personnel issues. He ritually has lunch with individuals on Grade 8 and above once a month and meets with Nicholls weekly.

Celltech is an openly-managed company (climate). Some of the ways this openness has been manifested have, however, been curtailed as the company has grown. In the early years of the company, for example, a correspondence file, including all letters into the company not of a personal nature, was left in a room for all staff to read. The file became too bulky, and this practice was stopped. Also in the early days the minutes of Board meetings were left in the library. This has also stopped. Nevertheless, I continue to report back to all staff on meetings of the Board. These company meetings are always well-attended and are perhaps indicative of the high level of information flow in the company.

Continuing growth may affect the 'climate' of the company. Close attention to the needs of individuals (and close proximity) is a major mechanism by which motivation is engendered within the company. Celltech aims to ensure that, as it grows, it attempts to maintain the high levels of commitment and motivation shown within the company. This motivation is very important to the company's competitiveness and its ability to do things faster or more efficiently than its competitors. The high motivation shown by Celltech employees has in the past manifested itself in extraordinary efforts. One manufacturing manager, for example, explained how, in order to save a batch of a product when a boiler broke down, he worked for 48 straight hours over a weekend to keep the process working. That this 'hard work' ethic continues is shown by a number of anecdotal instances, such as the high number of cars remaining in the car park after 6.00 pm and a manager explaining his guilt at having to leave the office at 5.30 pm, knowing his staff will remain for at least another hour. One company director says that his last task every day at 7.00 pm is to insist to his staff that they go home.

### Conclusions

- Company attitudes and structures are the single most important influence on innovation.
- Intense interaction and sharing of knowledge between people who are well informed on a wide variety of subjects provides the right basis for innovation.
- Successful innovation needs skillful project management.

### Q.4 How effective are the activities of Government departments in promoting and supporting innovation?

The CBI recently published a review of DTI support for technology in UK industry under the title *Technology for Enterprise*. I understand that this has been provided to the Sub-Committee. I was a member



*9 May 1990]**[Continued]*

of the Steering Group for the CBI study and I believe its conclusions give a fair picture of the effectiveness of the DTI in promoting and supporting innovation. I have little experience on the effectiveness of other Government departments in this direction.

*Q.5 What are the effects of City attitudes to investment in innovation?*

The City loves innovation providing it makes money. The problem is that most City institutions find it difficult to identify which innovations will make money, especially if their lead times are long, by which I mean around eight years or more.

Large companies in the pharmaceutical industry can spend several hundreds of millions of pounds a year on R&D. City institutions generally welcome this spending because they know that new products can be highly profitable. However, their financial analysts follow the progress of these products through the development process, particularly through clinical trials on which information quickly becomes available to the public, and investment opinion can change greatly as a result. In other industries where information about the progress of new products is less readily available, financial institutions rely more on the innovative history of the company concerned. If the company has shown that it can bring a succession of profitable new products to market or if process innovation continues to reduce costs, then spending on innovation will be favoured by the City. But if the track record is poor, cut backs in R&D will be called for.

For new companies, and to some extent when existing companies enter new fields, there is no history on which to judge prospects for successful innovation. It is therefore necessary for City institutions to make their own judgements. Specialist investment funds are set up to do this, whose staff have some knowledge of the relevant area of science or technology. Innovative new companies in the USA, especially in California and Massachusetts, have for many years had the benefit of well informed investment banks and venture capital funds. In the UK this development has been more recent but it is fair to say that excluding the US, the UK is relatively well placed.

However, there is a serious underlying problem. When interest rates are at current levels the rate of return on innovative investment (which inevitably carries risk) expected by the City is extraordinarily high. It is often said by the City that any good project will get finance. But as the implicit definition of a "good project" is one which is worth financing that statement does not mean very much. In Japan, with its long history of much lower interest rates, the number of "good projects" may be much higher than here—Japanese manufacturing industry is correspondingly strong.

*Q.6 What is the effect of the legislative and regulatory framework?*

I would like to comment on two matters under this heading:

1. European Community legislation and regulation on drug registration, i.e., the process by which drugs are approved for marketing within the Community. If this process does not work well companies based in Europe may suffer disadvantages compared with those based say in the USA.

2. The attitude of the European Patent Office (EPO) towards "enabling" disclosures in patent applications. It appears that the EPO is moving towards a policy that patent priority documents must be fully enabling. If this happens, smaller companies will find themselves less and less able to compete and academic researchers will face conflict between the demands of an academic career and the need to ensure that the results of their work are properly exploited. Again, the situation in the USA appears more favourable than that in Europe.

My concerns about these two matters are described in the attached paper, which is a talk given at a conference last November, together with an addendum written after a recent Court decision.

*Conclusions*

- A well resourced and effective European regulatory agency for approving the marketing of drugs is of great importance for innovation in the pharmaceutical field.
- Also important is the right patent system. Recent decisions in the European Patent Office give cause for concern, particularly about the effects they may have on academic researchers and smaller firms.

*9 May 1990]**[Continued*

**TALK BY G.H. FAIRTLOUGH  
AT  
“PATENT TERM RESTORATION & THE REGULATION  
OF EUROPEAN PHARMACEUTICALS”  
CONFERENCE  
22nd NOVEMBER 1989**

**BIOPHARMACEUTICALS IN THE 1990's:  
HOW WILL EUROPE DO?**

I do not think it is possible to consider properly the impact of changing European legislation on the pharmaceutical industry without considering the changing nature of the industry's technology. Changes in legislation and regulation can interact positively or negatively with new technology. We must do our best to see that the changes are positive, otherwise Europe will lose in the fiercely competitive struggle with the US and Japanese pharmaceutical industries.

My talk today will be in three parts:

- 1) A brief review of the new technology of biopharmaceuticals.
- 2) A discussion of the interaction between the new European drug registration regime, the CPMP and so on, and this new technology.
- 3) A comparison between the European and US patent law and patent practice as it affects drug discovery in general and biopharmaceuticals in particular.

**THE NEW TECHNOLOGY OF BIOPHARMACEUTICALS**

Ten years ago the prospects for the new biotechnology—which is mainly recombinant DNA and monoclonal antibody technology—became front page news. All sorts of speculation took place—intellectual and financial speculation—and some of it was pretty wild. Today we can review what has actually been achieved, and what reasonably can be expected during the first half of the 1990's. I am concentrating on the pharmaceutical field, but of course there are applications in other areas, notably agriculture which are also very important.

- Hormone deficiency diseases like diabetes and dwarfism are being very successfully and routinely treated with recombinant-DNA based drugs.
- Thrombolytic products are already making it possible to treat heart attacks much more successfully—many lives are being saved.
- The hormone erythropoietin is improving the quality of life of many people with kidney failure and has great promise for treating anaemias of other kinds.
- Conservative forecasts for sales of biotech products by the year 1995 are \$4 billion world wide. This compares with forecasts for that year of \$5.5 billion for hospital systemic antibiotics and \$4 billion for conventional cytostatic agents used mainly to treat cancer.
- The engineering of monoclonal antibody molecules promises at last to provide something like a “magic bullet”. A way of targeting therapy to particular cells which should have lesser side effects than current therapy particularly in the field of cancer.
- The biopharmaceutical revolution has given an opportunity for new and dynamic firms to enter the industry.
- It is also stimulating a wholesale reorganisation of drug discovery—multi disciplinary teams, mechanism-based drug design, new organisation cultures are affecting all the players in the industry.
- The potential is far from exhausted. There has been a huge increase in understanding of how the human body functions. Its genetics, biochemistry, physiology, pathology are becoming far better understood. The possibilities for future discoveries are colossal.

Many commentators, for example the Office of Technology Assessment of the US Congress, have tried to foresee which countries are most likely to succeed in the race to bring the new biotechnology to market. The conclusion which several have reached is that the USA is in the lead, that Japan is likely to catch up in due course and that Europe will be left behind. I think this is certainly not inevitable. In basic science there is enormous strength in Europe, as demonstrated by the extraordinary fruitfulness of research at places like the MRC Laboratory of Molecular Biology at Cambridge. The training of scientists here is excellent and



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[Continued

pharmaceutical firms based in Europe continue to compete very effectively in the world race. But it is a tough fight and one in which Europe cannot for one moment relax. High levels of R&D spending are required, which carry a lot of risk and which need very skilled direction. The right environment for patenting, product registration and for pricing is vital for the new technology as it is for the drug industry as a whole.

#### EUROPE'S NEW REGULATORY SYSTEM

In designing the new drug registration regime the European Commission chose as its spearhead high technology products in general and biopharmaceuticals in particular. This was for two reasons: because it was expected that it would be easier to introduce a new system for a new type of product and because it was felt that it would help the introduction of an important new technology—a declared aim of the European Community. A further aim of the Community is to achieve a fully integrated internal market in the field of pharmaceuticals by the end of that magic year 1992.

The Committee for Proprietary Medicinal Products (CPMP) was formally established in 1976 and its original function was to enable rapid mutual recognition of member states' approvals. This is the so-called multi-state procedure under which a licence granted by one state may be recognised by some or all of the other states in the Community. For products of biotechnology, those I have called biopharmaceuticals, the Community established in 1987 a mechanism called concertation under which the CPMP itself considers applications before their evaluation by member states.

Experience with the CPMP's initial multi-state remit has been mixed. Some fifty or more multistate applications have been completed, often with considerable delays compared with the timetable laid down in the EC Directives which established the procedure, and not all member states granted licenses in mutual recognition in spite of the procedure having been followed. The newer "high-technology" concertation procedure has only had two years to run, but experience so far is reasonably favourable. Products such as Erythropoietin and Interlukin-2 have benefited from it, and applications for registration of these products progressed reasonably rapidly. So it may be possible to say that Europe has responded quite well to the challenge of simpler and more rapid registration, but in ways which do not lower the high standards which are essential to protect patients and indeed to protect responsible firms from the danger of "cowboy" operators.

A further feature of the concertation procedure for high technology products is the protection which it affords to the first applicant for a particular product. Partly because of the uncertainties which inevitably arise about patentability for the products of novel technology, the Commission wished to give an advantage to innovative firms in the high technology field. The EC has therefore laid down that the data submitted in support of an application cannot be used to support an application from a second company for ten years after the first company's application is granted. This does not prevent a second applicant from starting from scratch and providing full data independently. Therefore, the protection afforded is not as good as a patent, especially if patent term restoration is achieved in the future. It is useful all the same.

My main concerns about the CPMP procedure in general and the high-tech procedure in particular are two:

- (a) Rivalry between national regulatory authorities and the CPMP, with the former fearing loss of influence and of jobs, may result in inter-agency squabbling imposing delays and extra costs on applicant firms.
- (b) The sheer volume of work which the CPMP will have to undertake may continue to cause delays regardless of the good intentions on which the procedure is based. Regulatory work is highly skilled and very responsible and it is not easy to recruit the kind of staff required, especially in a multi-national context.

To sum up. The EC initiatives in the area of drug registration are commendable, especially for biopharmaceuticals, but there must be real fears about how well they will be translated into practice. Europe's main competitors—Japan and USA—have the advantage of truly unified national legislation and government agencies. The EC has, in effect, transnational and national bodies performing the same tasks simultaneously.

#### EUROPEAN AND US PATENT LAW

Laws governing patentability are pretty similar all over the world. In general, for an invention to be patentable it has to be *novel* (something no one else has thought of before), *inventive* (not obvious to someone experienced in the field in question) and *useful* (not just an interesting idea with no practical application). The description of the invention also has to be *enabling*, which means that the patent specification describes the invention in sufficient detail to enable someone skilled in the art to do what is claimed. This criterion of enablement is particularly relevant to what I want to say today.

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I said that patent law was reasonably similar in every country, but there are differences and sometimes these are important, particularly if the field is a very competitive one, with laboratories all around the world trying to be first to discover the same thing. The differences between the US system and the European system are significant and on top of that both systems are changing and this has started to present a serious problem for European researchers. The problem is particularly acute for academic researchers, for smaller firms and for firms which are making a serious effort to collaborate closely with academic researchers.

Priority in a competitive field is highly important because if you are even a day ahead of your competitor you get the patent and your competitor is nowhere. In the US system priority is decided by reference to the date of invention, which is determined by examination of laboratory notebooks and other records. In the European system priority is by the date of filing, i.e., when you actually present your claim to the patent office. The European system has the merit of making it absolutely clear what the priority date is, avoiding a lot of argument which can arise within the US system. On the other hand, with the US system the inventor need not worry too much about enablement. It cannot be expected that at the date of the original invention everything will be clearly set out in a way which allows others to replicate the idea. The US system allows this to be added to the patent specification later on. Under the European system the filing has to be reasonably enabling, but traditionally it has been possible within a period of one year after the first or preliminary filing to add further data, allowing "enablement" to be completed during this year. There is always a dilemma about when to file, because it is usually possible to make a better description of the invention if you delay. On the other hand, delay may result in your being pre-empted by someone else. So priority has to be balanced against enablement.

Until now there has been a reasonable balance on this point between the US and European systems because the European system (particularly the UK system) required only limited enablement in the initial filing, providing full enablement could be produced within a year. I believe the US system did favour US researchers, which is no doubt why the US persisted with it in spite of the administrative difficulties which it creates. But the bias towards the US was tolerable. However, there are now signs that the European Patent Office will insist on much fuller enablement in the initial filing and if this trend continues it will constitute a really dangerous disadvantage for European research. Ideally we would all like to see harmonisation of rules of this kind with the US and European systems coming much closer together—the level playing field as it is called. But this is obviously a rather distant goal. Until this day dawns I believe it is essential that the European Patent Office retains the system under which initial filing need not be fully enabling.

I mentioned the effect in academia and smaller companies. Obviously a huge industrial laboratory has more resource available to throw into a massive effort to produce the data required for fuller enablement at the early stage. It will still cause delay but less than would usually be the case for an academic lab or a small company. I believe the European Community policy and UK government policy (through the LINK scheme and other methods) is absolutely right in encouraging industry/academic collaboration in all areas of science. This collaboration will be harmed if the trend I have identified continues.

Academics need to file the concept early to get academic priority for their work thus permitting early publication as well as patent protection. This almost always precludes a fully enabling description but it is usually possible, especially with industrial help, to provide this in the ensuing priority year. If, in future, academics must hold their data confidential until full enablement is demonstrated, most of them will decide to publish and lose patent protection. This would be a serious setback to the excellent progress now being made linking academia and industry. I very much hope that the whole question gets full and urgent consideration. Patents play a vital role in promoting innovation. Getting the right patent policies is one of the key tasks for government including the earliest stages of a patent's life which I have been discussing and the later stages on which others are speaking today.

## CONCLUSIONS

When help by governments for new high technology is discussed there is often an assumption that help equals money. In fact that is by no means always so. Today I have described two areas where I believe the competitiveness of European industry, certainly the biopharmaceutical industry, could be enhanced by improved procedures. Possibly some cost could be involved, by way of increased budgets for the agencies concerned, but even this may not be needed, and in any case the cost would be small compared with the benefits. What however is needed is consistent and careful thought about the issues on the part of governments and the EC Commission. These are complex issues, involving professional opinion which quite properly has to be independent of the interests of the industrial firms. But the interests of European industry as a whole must be given full consideration. If our way of working in Europe does not allow for this, then the forecast that Europe will fall behind in the high technology race may sadly turn out to be correct.



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## ADDENDUM

A recent decision in the UK Court of Appeal has a strong bearing on this situation. Briefly, in a unanimous decision concerning the conflicting priorities of two applications covering the same invention the three justices said that a priority agreement does not have to be enabling to be entitled to its priority. In reaching this decision they were upholding the view of the UK Patent Office.

This is a decision of a UK Court, thus it has no direct bearing on the decisions of the EPO. Furthermore, as a practical matter, it can only be used over patent applications which have reached a point of examination or litigation in the UK. And application which is made via the EPO may lose its priority within that jurisdiction during the course of prosecution, and thus no patent or examination will arise in the UK upon which this judgment may have a bearing.

The judgment was made to provide an interpretation of the law, specifically the Patent Act 1977. This act was written to have the same meaning as the European Patent Convention, which governs the EPO decision, where possible using the same language. Even where differences exist the Act is to be interpreted as having the same meaning as the convention.

The judgment was made on a matter of law not expediency or principle and indeed the facts were not disputed in order to get a decision on fundamental issues of law. Thus although it is a UK law, the intention to have complete coincidence between this and the convention means that it is also a judgment on interpretation of the Convention. The degree to which this will influence the Technical Board of Appeal of the EPO is at the moment a matter of conjecture.

*Q.7 How effective are the mechanisms for technology transfer from academia to manufacturing industry?*

During the last ten years there have been great improvements in the scope and effectiveness of technology transfer from academia to industry within the UK. Part of this stems from financial pressures on academia and competitive pressures on industry and part is due to administrative changes, such as the abolition of the NRDC monopoly. But, in my opinion, the biggest change is one of attitudes. Academics and industrial managers now take each other much more seriously and are willing to work at co-operation in a professional way. The use of specialists, called industrial liaison managers in academia and academic liaison managers in industry, is growing rapidly. This is an encouraging sign of changed attitudes and should, in itself, change attitudes further.

In some areas of science and technology (certainly in biology and chemistry) the creation and protection of intellectual property is a particularly important facet of technology transfer. I would like in my evidence to concentrate on this and to start by quoting from a talk given by Dr Lita Nelsen of the Massachusetts Institute of Technology.

“Our view of the patent system’s value comes from our humbling knowledge that even the most valuable and well-recognised scientific discovery or invention arising from a basic research institution such as M.I.T. is a long way from a useful product. The discovery as reported in scientific journals, and even at the stage that the academic researcher has ‘completed’ his research, is often in, at best, an embryonic stage of development as a useful drug.

“Patents on these inventions provide the mechanism by which we can induce a commercial organisation to invest the many years and millions of dollars—often at considerable risk, since there is no guarantee that the development will be successful—that are needed to develop this early-stage discovery into a useful biomedical product. In return for a company’s commitment to this development—and a fair royalty, of course—we can offer a limited period of exclusivity in the market, which will allow the company a fair return on its investment.”

Basic research is not aimed at applicable discoveries, so these arise in a rather random way which makes it difficult to ensure that intellectual property is created. If academic scientists had a greater understanding of the subject then they would be more likely to spot opportunities for creating intellectual property, and it might be useful for me to distinguish between the different skills needed.

The *identification* of patentable (and copyrightable) discoveries is not a simple matter, particularly in novel fields where case law has not yet delineated clearly what is patentable. Recognising the significance of a discovery will often require some knowledge of the scientific field and there will be a need for the people concerned with identification to be able to communicate well with research scientists. For example it will be necessary to explain that an initial patent filing need not be a complex task, but in the UK it is necessary for the discovery to remain confidential until the filing has been made. If this process is efficiently carried out there need be no delay to publication of the discovery. A good way of providing advice and service at the identification stage is therefore for a practising scientist to give say one third of his/her time to this task. Such a person will be able to serve up to 100 researchers keeping them aware of what has to be done to protect intellectual property and helping to do this when discoveries are made.

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[Continued

The next stage is the *protection* of intellectual property, achieved by making well written patent applications and by filing them initially in the UK and later in important territories around the world. A further task may be the organisation of experimental work aimed at confirming and widening the area of discovery, protecting for example, variations on the original discovery which might otherwise be exploited by others in order to avoid the claims of a patent.

*Exploitation* should then follow, by one of two main approaches:

- (a) widespread non-exclusive licensing (normally for a low level of royalty) of a basic technology, or
- (b) granting exclusive licenses to one firm (or semi-exclusive licenses to a small number of firms) to develop products or processes under the umbrella of this protection. The main advantage of this approach is that exclusivity can give the economic incentive to spend money (often a lot) on development. Exploitation also involves challenge to infringers and the accumulation of patent portfolios.

Finally, these activities need to be distinguished from the activity of industrial liaison which helps research scientists in getting financial support from industrial firms and in negotiating the terms on which this support is provided.

Protection and exploitation of intellectual property is a specialist task, requiring access to qualified patent agents and solicitors and often to industrial companies. Research organisations need to establish policies for these activities and research scientists need to have some familiarity with them but should not, of course, attempt to become experts in the field (except as a change in profession).

I believe that a greater awareness of intellectual property matters among academic scientists could best be fostered by overall policy direction and by training of individual scientists.

As far as policy direction is concerned, the Universities Funding Council, the Research Councils and similar bodies should include intellectual property objectives in their own corporate plans and should insist on this being done by the bodies which they fund. Performance in achieving these objectives should be regularly reviewed. If this were to happen then the career prospects of individual academic scientists would eventually be enhanced by their contributions to meeting intellectual property objectives. Scientists would then see the advantage in becoming much better informed on the subject.

Complementary to this is training for research scientists. I suggest that the training which needs to be provided is primarily in the area of *identification* of intellectual property.

It would be good to see the provision of training starting at the undergraduate level. If all science and engineering graduates had, say one week of teaching on patents (with the prospect of an exam question on the subject to hold their attention), this could in time make a great difference to the generation of intellectual property from UK scientific research. The Patent system is an intellectually coherent subject, historically and socially interesting. Even a fairly superficial knowledge of it would benefit academic scientists.

However, such a system will not be established tomorrow and there is anyway a need to train those who have already passed the undergraduate stage. The first suggestion is therefore for a training course probably of no more than 3 days length which would aim to make research scientists aware of the system of protecting intellectual property. The objective might be to provide such *patent awareness courses* for some 10-15 per cent of researchers over a period of say five years. This would be an ideal subject for *distance learning* organisations like the Open University, which could collaborate with the patent and legal professions in providing courses of this kind, which need not be aimed solely at biologists.

The second suggestion is for training aimed at the part time specialists in the identification of intellectual property described above. People of this kind would require 3-4 weeks of training, plus subsequent conferences and seminars to expand their knowledge and keep it up-to-date. These courses should be aimed at biologists, and might well be organised by the Institute of Biology. Combined with some years of practical experience they might later lead to a professional qualification of some kind. However the immediate need is for good 3-4 week courses in the *identification of intellectual property*. It would be important to involve chartered patent agents from professional firms and industrial companies in these courses to ensure high standards and an up-to-date approach.



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[Continued

*Conclusions*

- Changed attitudes towards each other on the part of academia and industry have greatly improved technology transfer
- Creation, protection and exploitation of intellectual property is an important aspect of technology transfer.
- Intellectual property capability should be strengthened by policy direction and by relevant training of research scientists.

**Examination of Witness**

MR GERARD FAIRTLOUGH, Chief Executive, Celltech, called in and examined.

*Chairman*

727. Mr Fairtlough, we are very glad to have you with us and are grateful to you for coming along to help us. Thank you too for the memorandum which you sent us about your company. Perhaps you could indicate clearly the amount of effort in your company that goes into R&D side and into the actual manufacturing?

A. The easiest way to do that, I think, is to talk about the number of people involved in the R&D and in manufacturing and the rest. We have about 470 people in the company now. Of those just over 200 are in research and development and just under 200 in manufacturing, quality assurance, engineering and things concerned mainly with making stuff, and then the remaining 70 odd are in sales, marketing, finance, administration and so on.

728. That is very helpful. Is there anything you would like to add to your memorandum?

A. I do not think so, my Lord.

729. What sort of problems have you faced in your company in its growth from what was a very small company to start with—perhaps you could just remind us how long ago that was—to quite a sizeable company in a very high technology industry?

A. Yes. In fact, nearly ten years ago in October 1980 the company was just one person, namely, myself. Within a couple of months we were up to 15 or so and by the end of the first year to 50. Then in the nine years since then we have grown to the 470 people I mentioned in the ten-year period. Actually that has been a more or less steady growth over that period, deliberately so because I think there is a maximum rate of effective growth because you really need to integrate people and, if you take on too many, you will not integrate them properly. The difficulties that we have encountered along the way—well, obviously any new organisation starting up has the immense problem of just getting going. This is not special to high technology and lots and lots of people have done it. Nevertheless, it is just worth bearing in mind that there is a lot of work to do actually to get an organisation in place, to get the disciplines there, to get the whole way of working effectively, and there is a lot of effort in doing that. So I think the lesson from that is that you do not start up something new unless it is really important

to do so, because there is a lot of effort required. So I would say in the first couple of years that was, if you like, the major difficulty. But we, along with lots of other new companies, managed to do that. I think many companies would say that the problem was raising money. I have to say that initially that was not our problem. We managed to come at the right time perhaps—biotechnology was particularly regarded as a good thing ten years ago and raising money was relatively easy to start off with. While I do not know whether that made us rather cavalier about money or not, I hope it did not because we knew very well that it might have been easy at that time but it was going to get difficult again. Sure enough, it proved that it did, but again I would say that we have not really been held back in the end by shortage of finance. Our last major fund raising was in October and November 1987, which you will recall was not a particularly good time for raising money as it followed the Stock Market crash of October 1987. However, we did at that time manage to raise a total of £42 million in a private placing, mainly with financial institutions, and that was largely raised in the United Kingdom, quite a bit of it from existing shareholders but also about £15 million from new shareholders. We also raised quite substantial sums of money in Japan at that time. Japanese interests hold about 10 percent of our equity now.

730. Would it be right to say the prospectus showed that your main activity was innovation in this relatively new field?

A. Oh, yes. I do not think anyone reading that prospectus could have concluded otherwise than the fact that we were investing a lot of money in R & D, that there was going to be a long lead time before we were going to make much money out of those investments, and that this definitely was innovation. There is no question about that.

731. How do the actual results compare with the projections you made at the time?

A. We were advised by Baring Bros and we were particularly careful not to make any explicit projections at that time. We raised the money in spite of not making explicit projections. As far as our internal results are concerned, at least for the first two years since then which are the two years for which we have published our results, they are in fact

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MR G FAIRTLOUGH

[Continued]

[Chairman Contd]

in line with our internal plans and in line with the general indications that I and others gave at the time of the raising of that money.

*Lord Taylor of Gryfe*

732. What kind of money were you talking about? Was it loan capital or equity stake?

A. Entirely equity capital. We have only one kind of investment in our company at the present time and that is ordinary shares, and we raised that money by a further issue of ordinary shares in October 1987.

733. It is very impressive that you were able to attract equity investment on the basis of no specific projection of company profits and so on.

A. Well, we did it, I do assure you, and I think it was a little unusual for a London based fund-raising of that size but it is not particularly unusual in the United States for companies in the high technology business.

734. Did you raise it from companies specialising in high risk venture capital or was it straight?

A. No, in most cases it was the unquoted section of large funds, pension funds or investment trusts of various kinds. Most of these funds have a relatively small amount of their investment money allocated to that and we got a slice of that.

735. How much are we talking about? What did you raise?

A. A total of £42 million.

Lord Taylor of Gryfe] Congratulations.

*Lord Kearton*

736. Would you describe your investors as patient, resigned or hopeful?

A. Perhaps all three. Of course, patient is what we would like to think of them as and I do not think that they have any reason to be anything other than patient in regard to what we led them to believe. As to hopeful, obviously you do not make longterm investments unless you hope to make a good return on them.

737. Is it not the case that one of your major investors is having to divest?

A. It is perfectly correct. That is one of the difficulties I was going to allude to. Our most recent difficulty is that one of our biggest shareholders, a shareholder from the beginning of the company, is British and Commonwealth, and they have been patient investors but unfortunately they have been overtaken by events and last autumn they decided they would have to sell their stake in the company. That has actually given us quite a lot of problems at the moment. So though they were very supportive investors for eight or nine years they have now got to the stage where they cannot be and that is quite a problem for us at the moment.

*Chairman*

738. A problem for you? It is a problem for them, is it not, finding a buyer for their shares?

A. Yes, but it is a problem for us also in the long run. Yes, short term you are right. They want to sell. It is not necessarily our job to sell their shares for them, that is perfectly correct, but what we want to see is a situation in which investors feel that Celltech is going to have an ability to raise more money in the future and that it is going to have patient and stable shareholders. For this reason other investors may not like the current situation. We know that some of them do not, and it will in the future make it more difficult for us to raise money, which is certainly going to be important for the company.

739. So it is a long-term problem for you but a short-term problem for them?

A. That is right. It also, of course, raises questions like: is someone going to make a bid for the company? That is possible, whether British and Commonwealth were in difficulties or not. Nevertheless, it does make it easier if a major pharmaceutical company wished to acquire Celltech; they could go to B & C and get, not a controlling stake but a large stake and then bid for the rest. That, of course, is well-known to our staff and our customers and that is again an unsettling aspect. We hope we can convince people that whatever happens they have a good future with us but it does add problems.

*Lord Gregson*

740. Is it possible you could get an overseas bid?

A. It is possible, yes.

741. Is there no protection at all within the Articles of Association?

A. No, we have not got any protection. We are just an ordinary company without any special restrictions in any way.

742. What would happen to your relations with the Medical Research Council in that circumstance?

A. Naturally, we have talked to the Medical Research Council and told them what is going on. I think it is more important from their point of view that we are owned by the right kind of investors, whether it is a single acquirer or whether there are other shareholders that come in piecemeal to take up the B & C shares. That is more important than whether it became owned by an overseas company because the long-term attitudes which come through to the company from its investors, the willingness to work with academia, the commitment to the kind of research that we are doing—those are the sorts of things that I believe are more important to the MRC than the fact that we are majority British-owned.



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MR G FAIRTLOUGH

[Continued]

[Lord Gregson *Contd*]

743. But is it not more important to the MRC that you do not have a foreign owner that takes your developments overseas and exploits them to the detriment of the United Kingdom?

A. Obviously it is not my job to speak for the MRC but what I am told by the MRC, and have been told over the ten or more years that I have been working with them, is that their set of priorities are, first of all, to see that their research is exploited somewhere, in other words, that good ideas are quickly turned into reality, and certainly we have been able to do that for them and we would hope that that would continue whoever owns us. The second thing, of course, is a British orientation, and what they tell us there is that it is more important that the activities take place in this country than the ownership. Those are the two key points in their view, so it is not, in my opinion, necessarily a dreadful disaster if we became foreign-owned. Perhaps what I am saying is leading the Committee to think that that is a likely outcome. I actually do not think that is the likely outcome. It is certainly a possible one but I do not think it is the most likely one.

*Lord Kearton*

744. My question also in a sense concerns the Medical Research Council. I think you had virtual or certain exclusivity on the MRC to begin with?

A. That is correct. During the first three years we had a deal which gave us exclusivity with the MRC's discoveries in the area of recombinant DNA and monoclonal antibodies. That exclusivity was a qualified one. It was really a right of first refusal and in the end, if we were not offering a good deal to the MRC, they could, after a six-month delay, go somewhere else.

745. What surprises me is that we had a submission from the MRC in which they told us they were keen to exploit their commercial discoveries but they did not mention Celltech.

A. That exclusivity ended six and a half years ago. I hope they have not forgotten us. We are certainly working very closely with a number of MRC units and for quite a period we were the biggest industrial contributor to MRC funds, and I suspect that may still be the case. I am, frankly, a bit disappointed that they did not mention us.

Lord Kearton] I was surprised.

*Lord Vinson*

746. Looking again at raising money, I would like to take up the point you made in your evidence about the negative effect on innovation of the interest rates that we have in this country. We used to try and manage our monetary matters to give us a real rate of return of about 7 per cent. compared to 2 or 3 per cent. in other countries. You have been quite fortunate in raising money to date, but do you think that comparable and parallel activities to the

ones you have been doing over the last nine or ten years have been frustrated by the high cost of money and you might have expected more people doing more research in other directions if the cost of servicing the ever-compounding 10 or 11 per cent. was not so horrendous?

A. As you say, we have been fortunate in Celltech and I would not want to say that interest rates have held us back because I think it would be quite difficult to prove that, but looking overall at investment in R&D, and certainly from experience in other activities before I joined Celltech, I believe that high interest rates make it more difficult to invest in things with long lead times. Especially if it takes ten years to come to fruition higher interest rates results in demand for a horrendously high and unreasonable rate of return, especially if you are competing against nations which have lower interest rates. I know you can regard inflation as to some extent counter-balancing high interest rates although not in every case, but I happen to think that on the whole high interest rates are not helpful to long-termism. High interest rates are, I think, against long-termism and you do need long-termism for this kind of investment.

*Chairman*

747. But you are in the fortunate position of having a lot of cash in your balance sheet, so you are not affected by that at the moment?

A. Absolutely.

748. I know it is difficult for you to speak about the future prospects but are you now continuing with your innovation in spite of your big loss last year or are you consolidating and trying to get some cash out of what you have done already? Has the financial situation affected your policy of innovation?

A. May I say on the interest rate point that my comments just then were more about money in general than Celltech in particular. What are we now doing? We are certainly continuing our R&D but a lot of that is directed towards getting to market those products which we have already taken through two-thirds or even three-quarters of the development process. We have, for instance, two candidate drugs which we expect to bring to market in the early 1990s and we are investing heavily in those, but you can see light at the end of the tunnel with those. As I am sure you will know, drugs can go wrong but we can see very clearly what we have to do to bring those to market and we are putting most of our investment into completing that process. We have other longer-term things but they are taking up a much smaller proportion of our funds at the present time. Our plan is that once those things get to market and start earning rather than costing, then we can switch, I hope, to some other things which we have in embryo and get those going in two or three years' time.

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MR G FAIRTLOUGH

[Continued]

*Lord Clitheroe*

749. You have had some eight or nine years of fairly substantial losses. Does this really relate as much as anything to the time that drug registration takes in these days to come through? Is that a factor in it?

A. It is an extremely important factor, yes.

750. What is the average length of time that you would say this type of product that you are making would take to go through the full drug registration process?

A. The average time for the pharmaceutical industry as a whole is now around ten years. The types of products we are developing are chosen, we hope, to have shorter lead times of perhaps around eight years because they are treating more critical, more serious illnesses for which there is no proper treatment at all and, therefore, the registration process can be speeded up. But it is a lengthy process. I think, although it is a damned nuisance from our point of view, it is right because you have to show that drugs are efficacious and safe.

751. You have a strong argument to say that the long time before making profits at the bottom line is intrinsic in the products that you are going for and that there is every prospect that in a year or two this will be making a great deal of money?

A. Yes. Of course, a successful drug can make a lot of money particularly if it is patented. Also the registration process makes it difficult for others to come in and compete, once you have got through it it is an advantage, a protection to the successful developer. Then profits from the drugs are good and the City knows that and that is why they are willing to take these long lead times.

752. That is why they are being reasonably patient so far?

A. Exactly. Lord Kearton said they were hopeful—well, that is why they are hopeful.

*Lord Taylor of Gryfe*

753. You have to do your research and development for several years, say ten years, before you get a licensing agreement or clearance. Then in your industry, with the colossal expenditure on marketing in the pharmaceutical industry, it requires a great deal of money before you really sell to the customer. Can you see your way ahead as a relatively small company in this industry compared to the big pharmaceutical companies? Would you see yourselves as able to sustain that kind of expenditure until you sell the successful drug at the end of the day or would you see yourself passing it over, having developed a good product and an acceptable product? You have marketed by licence rather than through any of the existing large drug companies who have tremendous power in advertising.

A. First of all, products we have chosen for our own development are ones which do not go to GPs, the GPs do not prescribe them. They are aimed at hospital use and often specialist units within hospitals, for example, for use by specialist neurological units where neurosurgeons and physicians concerned with the brain are the ones who would prescribe the drugs. So that in that particular example there are about 40 centres in the United Kingdom. Now, obviously selling to those does not require massive advertising or anything of that sort. So we have chosen that kind of product and, if we discovered things that are not that kind of product, we would not seek to develop them on our own. Instead we would seek a sponsor from a major pharmaceutical company at quite an early stage. Even so, even given that specialist end user market which we are going for, in markets like the United States and Japan we do intend to seek licences at least for the first products. So we are trying to keep the marketing task to one that a small or medium sized company can adequately handle.

*Lord Vinson*

754. Are there any tax implications of selling or buying know-how that inhibit the free exchange of it in a way you would wish to do it? Are you looking over your shoulder at the tax implications sometimes—when you either buy in because of the write-off period or are selling—and the effect they may have on the bottom line, or does that not affect your thinking?

A. We certainly do try to take tax into account.

755. If so, to what extent, if any, does it inhibit you?

A. First of all, of course, as far as Celltech is concerned, since we have not been making profits we are not paying taxes. Therefore, although we are looking ahead and trying to get our business into a shape whereby in the 1990s we will be paying taxes, the impact is not an immediate one, which obviously makes it a less critical issue than some. But trying to put ourselves in the position of a company that is currently profitable and currently paying taxes, it may be lack of knowledge on my part but I do not think there are any severe problems from the tax point of view as far as buying or selling know-how is concerned. It is no more onerous, as far as I am aware, than buying and selling other things.

756. That is contrary to the CBI evidence we have seen where they felt the tax implications of not being able to write off that know-how were inhibiting. That is probably because you have not come across that particular barrier yet.

A. Maybe. It may be that in a few years time we may feel something different. I might be right all the same.



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MR G FAIRTLOUGH

[Continued]

*Lord Gregson*

757. Two connected questions, Mr Fairtlough. In the venture capital field there is a fair amount of indication that institutions are becoming somewhat less patient than they were. You said when you were talking about the B & C problem that some of your other shareholders were a bit agitated. Is there an indication that they are becoming a little less patient than you would really desire?

A. I think that there are cycles in all of these things and I have seen in the ten years of Celltech several cycles, partly because right at the beginning, as I have already mentioned, biotechnology was very fashionable. Then after two or three years it went out of fashion, then it came back in again as some biotechnologists started being particularly successful. So I have seen that cycle, and also there are more cycles which are not specific to biotechnology which relate to risk aversion—they relate to interest rates too, I believe, to a certain extent—and I think we are in a period right now where there is a greater degree of risk aversion than normal. I would anticipate that that might change again but right now I think that is the situation. The British and Commonwealth thing, I think, is generally unsettling rather than anything very specific.

758. The other question connected with this is, are your finances constrained or are your resources constrained? Would you spend more money if you had it or are you short of staff anyway and could not find the resource to spend it?

A. In my experience, you can always spend money. That is based not so much on my Celltech experience but on experience in a large company when there were times when we were encouraged to spend money and you could usually find a way of doing it. On the whole, that is probably the wrong thing to do. I think you tend to make better judgements about how to spend money, and are more economical and frugal with it, if you retain feeling it is short.

759. Would it not be to the benefit of the country if some of the other ideas you have in the background were more rapidly developed than maybe you are allowed to do at the moment because of the constraint of finance? You did say you concentrated on the finance and applying the resources to those projects which had a much shorter return and you had got others already straining at the leash to be put into the gate ready to be sent down the racetrack. Would it not be to the benefit of the country, therefore, considering that we have an enormous negative balance of payments, if you were able to finance those other projects?

A. If finance were not a resource constraint, I believe we would run into another restraint and that would be management, because managing these projects, as perhaps I indicated in the first part of my evidence, is a complicated business and it is very important to get it right. I believe that if a magic

wand were waved and we felt it was absolutely the right thing to do overnight to spend twice as much money, it would be very hard to manage that.

760. Are you really saying the management is not available in the United Kingdom or that management is a weakness in the United Kingdom or is it just a weakness in your activity?

A. I was talking about Celltech and I think you have to expand your management gradually and that trying to double-spend overnight would not be an effective thing to do. If you knew there was, if you like, a surety of spend over a five- to ten-year period, then you could expand and develop.

761. That is what I had in mind.

A. Yes, I think it could be done but I want to make it clear that we regard finance as a constraint which could only be overcome gradually. It is an important one but if that was removed we would then still have the management constraint.

*Lord Chorley*

762. Can I ask a question arising out of Lord Gregson's and your institutional shareholders who at times may have been getting impatient. You referred to fashions changing. Has that resulted in your having to change your general corporate strategy in ways you would prefer not to? Have you had to ride with these fashion changes or things like B & C falling apart?

A. We certainly have not made dramatic changes in our policy, except in 1987 when we went out to raise that additional money. We made it clear that if we were successful in raising the money then we would increase our spending on a certain number of projects and go through to the marketing of these products ourselves, at least in the European markets, which before that we had not been able to do. In the past we looked to license out our ideas and not take the products through to market ourselves. So that was a planned change in our activities but apart from that we certainly have not made any dramatic changes during our history. We try always to be conscious of the financial climate and that gets transmitted through to the daily decision-making and maybe you might turn down something which you would otherwise have had a go at if the climate was rather unfavourable. You might, in balancing all the risk factors, put that in more heavily. That has probably happened.

763. In other words, you have not had in any serious sense to cut back on your R&D in order to show a bit better bottom line?

A. No, we have never done that. It might have been that the amount of expansion or, to some extent, the degree to which we were going for very long-term projects or for shorter-term ones might have been influenced on occasions by the financial climate, but we have not done anything like: "Oh

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[Continued

[Lord Chorley *Contd*]

well, we have to make our target at the end of the year. Fire 50 scientists." We certainly have not done anything of that sort. It would be disastrous in terms of morale and commitment to the longer term if we did that and outfits like the MRC would be pretty unhappy, too.

764. The second one arises out of what Lord Vinson was asking about taxation. In evidence we have had from some quarters—and I cannot remember where it was now—there was a suggestion that the Inland Revenue might not in all cases have treated as the same trades two different aspects of the business, and you clearly have in a sense two different aspects. You have the services, which is really contract R&D, as I understand it?

A. Yes.

765. That, in effect, keeps pace with the rest of your R&D. The Inland Revenue never challenge that as being separate trades and therefore, not allowing you to offset the profit on your R&D expenditure against your fundamental work?

A. No, we have never had a problem there, and I think it would be perfectly possible in our case to demonstrate that it is one trade because individual people, individual scientists, work on both things and we are flexible in moving resources between the two. For instance, as the projects go through certain phases they need different resources and we move them around. So, while I hope I am not being complacent about tax problems, we certainly have not had them so far. I can definitely say that.

*Lord Taylor of Gryfe*

766. I was encouraged by the first sentence of your reply to the questions: "In my experience company attitudes and structures are easily the most important influences on innovation in manufacturing industry." I think that is something that has to be accepted and you have worked very deliberately to encourage innovative attitudes in your company in that you have a rather loose structure but a stimulating structure of people to exchange ideas and meet together and so on. Indeed, as I read through your interesting submission I wondered if you had any sort of clear definition of board responsibility and, below that, staff responsibility, whether you had a specific structure or whether it was this kind of loosely defined happy family kind of environment that you describe in your paper and whether you had any problems in that regard? Secondly, you did sound like a very happy family and I wondered (a) how you recruited, and (b) whether you lost people to the highly paid opportunities that are available in the pharmaceutical industry?

A. I hope that my evidence did not give the impression that while it is a happy family, it is a family that runs wild, because that is not so. I did mention in my evidence that we had a very tightly organised project management system and that is

particularly important. We have good senior scientists in charge of projects who are very much committed to making sure that they get the resources dedicated to those projects and that projects meet their timetables and so on. So I would not want to give the impression that there is a looseness of attitude. People are very committed to these projects. They do not need to be supervised on a daily basis because they are very keen on the success of the projects. There is a senior management responsibility and on the most important things there is board responsibility for control of where we do the spending and this involves the usual thing of preparing cases and bringing them forward, having them examined and then getting approval for spending on a certain pattern. For example the split between the shorter-term and the longer-term projects needs such approval. So that is decided at the top but then, having committed a certain amount of money to a project, the way that particular bits of laboratory research or clinical research are organised is, in my view absolutely rightly, left to the people who are there running the project and committed to it. Regarding recruitment, my experience is that you always have to work very hard to recruit good people because you have to select very carefully and make sure that the people really are going to bring the skills you need. However good they are at things in general, there are some specific things that you need, so you have to put a lot of effort into it.

But once people do join us I think that on the whole they like the atmosphere that we have, they like the responsibility that they are given, the fact that it is a demanding environment but nevertheless a pleasant one in terms of the way people interact and so forth, and we do not lose a lot of people to other companies. We would lose some. For instance, quite a senior scientist was recruited by Glaxo recently, about a year ago, at a substantially higher salary—this job at Glaxo involves managing a group of 100 people compared with the 30 people for whom he was responsible at Celltech. We are going to lose some people like that. I am glad to say in that particular case we were able to promote an internal scientist who was already working for us and that person has already taken on the job satisfactorily. But, yes, it is something we have to watch and maybe we will lose people in the future. So far it has not been a serious problem, I am glad to say.

*Chairman*

767. Can we move on to your views as to the science-based store of knowledge in the academic world and government establishments alike and whether you feel you have good access to that? Are there any problems in making use of it or do you not think it is very important?

A. It is extremely important. One of the specific aims which I publicised right at the beginning of the company's existence was that we would try to have a way of working with academia which was superior to the average in industry at that time. I think we



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[Continued

[Chairman *Contd*]

achieved that and I think we did it by deliberate hard work, management attention and a determination that we were going to work well with academia. It has been of enormous importance to us. We could not possibly have got to where we have without very good links with academia. Answering your question about the importance of the science base, I see that as providing three things to industry. First of all, trained people. Obviously if the supply of trained people was not there companies like Celltech could not possibly get going and that is now quite a strong point of concern. I think the numbers of PhD scientists that are being turned out in the biological sciences is now dropping severely and that is something we should be seriously worried about. We have actually got quite a few people studying for their PhDs while working for Celltech. That is not in my opinion an ideal way of doing it. I think it is better that their study is undertaken in universities. But we have had to do that to a certain extent because of the difficulty in getting good PhDs in the biological sciences. Trained people are the first and perhaps the single most important thing. The second thing we want is that the science base should be a source of new ideas, at least in certain parts of science. Perhaps it cannot be across the whole of science, as it would be unreasonable to expect Britain to be in the lead in every area of science. In a number of areas we must have real centres of excellence within the UK which are generating ideas and spreading those out. This allows industry to find good consultants and to get stimulation from that basic scientific research. I am talking about curiosity driven research and I think it is extremely important that it should be of world competitive quality. The third area is ability to collaborate on specific projects and that is the area that an industrial company has to work hardest on. I believe that the willingness of academic institutions to work with industry has changed a lot since Celltech started. Academia is now very much more aware that industrial collaborations can be not only beneficial financially but also beneficial intellectually and beneficial because industrial firms can provide materials which advance the academic researchers' own goals. Skill in organising large collaborations is something that academics are learning and industrialists are learning to a greater extent—but it could go a lot further in my view. I hope that the science base gets strengthened and continues to be of world calibre because otherwise I do not see much future for companies like Celltech in this country.

*Lord Butterworth*

768. You spoke of collaboration with academic institutions. Could you give us one or two successful examples? What does collaboration mean? How do you organise it? Could you give us one or two examples so that we might understand it a little better?

A. Yes. It starts at its simplest with the Medical Research Council or the Science and Engineering Research Council CASE award system and where, if

the company will agree to fund part of the costs of a PhD student (that is a commitment of about £3,000 over a three-year period by the company), then the Research Council will also commit to funding the student. What that does very largely is to give us an entree into a university department, a close link to a particular professor or lecturer in a university, which allows us to understand what they are doing and gives us a feel about a particular area of science which is likely to be relevant to what we are doing. So that is, if you like, the most basic and simple way of collaborating with academia.

769. Is that the method by which you discover what is going on in academic laboratories, or do you have other means? If there may be a biological department which is breaking out into some new field that may be potentially of interest to you, how do you actually get to know this?

A. This CASE award is one way of getting to know. There are numerous other ways. Reading the literature is probably the most important one because academic scientists need to publish and do publish and, if you read the relevant scientific journals, you can see what is being done in academia around the world. Also attending conferences is important. You can have academics as your consultants and we have a Science Council of senior academics that point us in various directions. There is a whole range of different mechanisms for awareness. If I can move on from awareness to something more tangible, perhaps I would start at the most intensive end and describe a collaboration we have with the University of Durham—it is a continuing one. This is in a particular area of chemistry. There is a very good group in the University of Durham in metallo-organic chemistry and this is relevant to some of the work we are doing. It is headed by a very active professor and at one time we were funding four full-time workers in that professor's department. We also made contributions to two or three others on a partial funding basis, and there were a couple of people in a sort of sandwich student mode coming to work at Celltech. So there were about half a dozen or more people involved in this collaboration working on relevant problems synthesising various compounds. This worked extremely well. We made a number of important patented discoveries in this field. These patents are filed jointly between the University and Celltech. We have an exclusive right to exploit them and the University has a royalty out of the eventual use of this patented property. The interesting thing in that particular case is that we were able to devise research programmes which not only met our industrial interest but also furthered the academic interests of this group. They were interested in the basic parameters of these various compounds and by careful choice of the different compounds that we chose to make we were able to satisfy our needs for things which would have practical use and which we



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[Continued]

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could patent and also to advance knowledge in that area which was the principal aim of that academic group.

I have obviously chosen a very successful example. There are others which have not gone as well as that.

770. And that was commercially successful, too?

A. That has been commercially successful, to the extent that we have now got some important patent property and these discoveries are now included in some of the products that we have on clinical trials and look as if they are going to lead to effective drugs. They are not actually approved drugs yet, for the reasons we discussed earlier, because of the long lead time, but yes, it is perfectly true to say it has been commercially successful. I believe it was academically successful, not only because of the funding and training which was involved but also because academic knowledge in the field was advanced.

771. It is very interesting, is it not? Sometimes it is said that university departments in the past did not collaborate properly with industry. Would it be true to say that if you look a few years ago there were not companies like Celltech who had the ability to carry out this kind of relationship successfully? What you are doing is a new departure, creating a new kind of relationship, not only within the university but within your company as well?

A. I believe that that is very largely so, although I have to say if you had somebody from ICI or Glaxo sitting here they probably would deny that, and to some extent they would be right. Ten years ago we were really pioneers in this field. When we went to visit universities there were a few other companies and they tended to be American companies. That has changed. I said in my written evidence and I said earlier today that I thought attitudes had changed in academia and in industry and they certainly have. So I cannot claim now that Celltech is unique. We remain one of the leaders in good academic liaison because we have learnt how to do this during the last ten years but we are not the only ones. From our point of view that might be bad but from the country's point of view I think it is very good.

772. You referred a short time ago to the DTI. In your experience, is the DTI successful in bringing together industry, universities and research establishments in fruitful research?

A. That is quite a big topic and I could spend some time on it. The main way that is done now, and has been done for the last three years, is by the so-called LINK programme. I would say that has been partly successful. It is seen by many as being rather bureaucratic and slow and I think that that is to some extent a justifiable criticism. On the other hand, there are now a number of LINK programmes going and certainly in our field they are playing a useful but not predominant role in encouraging

industrial academic links. Industries which traditionally have very little contact with academia. For instance in an area like heating, ventilating and air-conditioning there has probably been very little contact between industry and academic researchers. Now there is a LINK programme in that field. Whether that has yet changed what was almost a zero contact between academia and industry I do not know. It may have started something. In our area, where there always was a reasonable degree of interconnection, I do not think that DTI schemes have made a vast difference but at the margin they have perhaps been helpful.

*Lord Chorley*

773. I was interested in a remark you made in the talk you gave at a conference which you included with your evidence, where you said the Office of Technology Assessment of the US Congress thought that the US was in the lead, the Japanese were likely to catch up and Europe was nowhere. It would be interesting to hear your views on why they thought that and generally on the nature of competition in this field. For example, if it is highly competitive is that inhibiting innovation or, on the contrary, is it spurring it? Is there competition in this country or is it mainly competition from abroad?

A. That OTA report I was referring to is now about four years old and I think if they did it again they might actually be a little bit more complimentary about Europe because I think the evidence has now come through quite strongly that Europe is pretty competitive in the biotechnology field, or more competitive anyway than they gave us credit for.

774. Did they reach their conclusions on basic science grounds?

A. No, I think the main grounds for those conclusions were what were then perceived to be the poor links between industry and academia in Europe. That was No. 1. No. 2 was the fact that there were clearly very many more start-ups of new high-technology companies in fields like biotechnology, microelectronics and advanced materials in the United States, and still are. Certainly four or five years ago that was absolutely the case. I think that the OTA's model of innovation for that particular report was one that all good ideas, or nearly all of them, come from academia and there needs to be an effective method of transfer into industry. So if links between industry and academia are poor, then that transfer will not be effective. Also that small start-up companies are a very good way of transferring information because people often move from academia into those companies, and the environment in those companies is more sympathetic to academia, with which I would agree. So their model of technology transfer and of innovation was one which said that academia was the engine and that although Europe had good academic science it lacked the transfer capabilities. If they did the report today—and I am guessing, of course—they might



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*[Continued]**[Lord Chorley Contd]*

admit that they had neglected the role of the big companies, because Europe has some very strong large companies in pharmaceuticals, as I am sure you all know. That is the first point. Secondly, I think Europe has improved, (certainly the UK has improved and I think Europe generally is improving) the transfer of technology from academia. So they might have a different answer today.

775. And that really is their competition model, in effect?

A. That was their innovation model and to some extent their competition model. Their argument about the Japanese was perhaps one we would all think about, that Japan is incredibly good at catching up that Japan was devoting a lot of attention to biotechnology and they would catch up. I think that was their argument in that case.

*Lord Vinson*

776. Can we take it that you see no inhibitions to technology transfer or development of technology and good ideas through the current matrix and framework of law we have regarding patents and licensing?

A. No, I regret to say I do not think that. I think we have some problems in the patent field, what is patentable in Europe against what is patentable in the United States.

*Chairman*

777. This is rather a big field and we are short of time. I wonder if it would be a good idea if you could let us have a short note on this. It is a very complex problem, the whole patent field.

A. My written evidence had quite a lot about it.

Chairman] Would you be able to expand on Lord Vinson's question?

*Lord Vinson*

778. I would like to get to the nub of the question. How would you like to see patent law changed beneficially to help the whole process?

A. I think that is quite a lengthy answer, I am sorry to say. What I would say is I would be delighted to take that up separately. I do consider it a very important point.

Chairman] You have discussed that quite a lot in your paper, but perhaps you could expand on it a little more in a note. It is a very complex problem.

*Lord Vinson*

779. It is the sort of point we might want to take up in our recommendations.

A. I hope you do because I think it is important.

*Chairman*

780. One general question: you seem to have done what everybody believes companies in new high technology fields should do, you have raised money as equity capital which does not require any return until you make a profit. You have spent a lot of money, so far you have not had great success from profits or operational cash flow. Do you see this process being ultimately successful? You have spent the money on research and development; do you now foresee it coming right and getting operational cash flow, profits, in the years ahead as a result of all this long investment and patient money you have had?

A. Yes, we have two drugs which have been in clinical trials for 18 months. It will take two to two and a half years more to bring those to market and they could, of course, go wrong but if they go right then I think that the model will be vindicated. The potential markets for those products are sizeable and that might mean that by 1995 we would be a company with a turnover of £150 million or so, so there is an opportunity of real success. Of course, it has got to go right in the next two and a half years.

Chairman] Thank you very much. It has been most interesting evidence and is very helpful to us. We wish you well in your very adventurous business.

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[Continued

**Letter from Mr Fairtlough**

Because time was short it was not possible to give a proper answer to the last of the Select Committee's questions on Wednesday, I therefore thought it might be worthwhile to give in writing my opinion on what measures would help to improve the patent system. I think there are three.

First, the question of enablement (which is discussed at some length in my previous written evidence) is of particular importance to academic researchers, to companies who wish to collaborate with academics and to smaller and medium sized companies. In my view it would be greatly to the advantage of all these groups if the European Patent Office were in future to follow the line of argument taken by the UK Court of Appeal in the case *Asahi Kasei Kogyo KK's Application* UK Appeal Court 1990. The Court of Appeal argued this as a matter of law. I think that public policy leads to the same conclusion.

Secondly, I consider that it would be beneficial for academic researchers and for those in industry collaborating with them, if European patent law were to be changed to incorporate a feature of US patent law. This is the so-called one year grace period. This provides that the publication in an academic journal of an invention cannot be cited as prior art against a patent filing by the author(s) of the academic publication, providing the patent filing takes place within one year of the academic publication.

Thirdly, as a rather general and certainly a long term suggestion, I think that it would be desirable for innovators if US, European and other major patent laws were, by agreement between the authorities concerned, to become much closer in their treatment of matters like enablement, establishment of priority date, and tests for novelty and for usefulness. International negotiations would of course be needed to action this.

I hope these points are reasonably clear and relevant to the work of the select committee. If amplification of any of the points is required I would be happy to provide it.

G H Fairtlough  
Chief Executive  
17 May 1990

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**Memorandum by Eurotherm International**

My comments on your questions, taken in the same order as in your letter, are as follows:

1. Company attitudes are crucial to innovation and, in my experience, rigid organisation structures inhibit creativity. Creative designers need freedom to operate and this is increasingly being recognised in US corporations. Strict application of certain financial criteria (e.g., R01) can also be harmful given that, in reality, the "return" may not be assessable in advance.

2. The success of the adaptation of external technology is very dependent on the area addressed. The use of technology in component form, e.g., flat screen displays or software packages, is commonplace and successful. Complete product ranges rarely transfer well.

My company, Eurotherm International, operates in the field of industrial automation and our products need to relate closely to users' requirements. I have witnessed competitors attempt to obtain products via an outside licence or by commissioning external development. I have never seen either process succeed in creating a successful product, because the company has lacked the in-house expertise which is needed in the market place. What happens is that initial engineering ideas are an imperfect match to the market place and the resulting product needs further tailoring to the user environment. If the appropriate expertise is not in-house, the resulting processes are too cumbersome to be successful.

3. Both product development and production engineering play a part in technological innovation and it is important that development engineers work closely with production engineers in order to understand the impact of changes in production technology. In the electronic engineering arena, these are particularly important at the present time with the advent of new components and new surface mount techniques. These allow both a far higher degree of integration and the simplifying of the production process.

4. I do not consider that government actions in promoting and supporting innovation are effective in any way in the area of activity covered by my company.

5. City attitudes, which generally seek short-term profit, can be extremely inhibiting towards investment in innovation. A strong management will, however, resist pressure for short-term gain at the expense of future expansion.

6. I am not aware of any adverse or other effects of the legislative and regulatory framework on the innovative process.



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7. I consider the mechanisms for technology transfer from HEIs, Research Councils and public laboratories to manufacturing industry to be largely ineffective.

8. I have no experience of EC support for innovation and cannot comment on the question.

9. The relationship between a company and its supplier is critical and there is a growing trend for a company to work closely with one supplier rather than use multiple sources at the expense of a close relationship. New components and component modification can play a significant part in product innovation.

10. Two factors have a major influence on decisions to invest in innovation in the UK or overseas, these being markets and people. I know of no way to make non-creative people become creative and in my experience it is best to back potential winners. These may be anywhere in the world and my own company has deliberately spread its development in the belief that there is more chance of a creative person emerging from several development situations than from one central facility. With regard to my own company's business, it is necessary that the development process is carried out close to the potential market. As the markets in developed countries vary in detail, it is better that the development process is kept close to the customer.

11. I have no knowledge of the relationship between the defence and civil sectors.

J L Leonard

Chairman

4 April 1990

#### Examination of Witness

DR J L LEONARD, Chairman, Eurotherm International, called in and examined.

*Chairman*

*Lord Kearton*

781. Dr Leonard, thank you very much for coming along and thank you for your helpful memorandum. Would you like to add anything to it?

A. I am sure it will emerge from questioning. There is nothing I wish to raise.

782. You have said you "do not consider that government actions in promoting and supporting innovation are effective in any way". Do you think the Government does not really have any part to play or do you think they could do if they changed direction?

A. I think one thing that must be stressed is that my answers apply to the industry with which I am familiar. Listening to the replies from the last individual, there are obviously other areas where there are different answers. We are concerned with the application of technology and the application of technology needs close contact with market places and people who use your technology, and I have not seen any successful government attempts in this field. I think I would like to see government focusing on education, especially technical education, because a threat that many companies like ours face in this country is shortage of engineers, which is a worsening problem, and also social attitudes towards engineering which I know there have been attempts to cure but we just have not got round to it somehow. Maybe we should change the word.

783. That is a major constraint?

A. Yes.

784. Yours is a most encouraging report. Your company is clearly people-led, is it not?

A. Definitely, yes.

785. In your unique area you are obviously world-beaters. You must take great care in choosing the people?

A. Yes. It has not been difficult. We started with nothing. There were four of us and we sort of selected people in our own image. It gets more difficult as we get bigger, of course.

786. Would you mind defining your own image?

A. We go first for technical excellence. We try and get high quality technical background which is research. We think in this respect British universities are second to none, or have been. There is a fear that they might be worsening in this respect. We then look for an underlying commercialism, a will to succeed commercially, which is quite hard to couple with technical background. Thirdly, we want the sort of personality which blends with ours and an understanding that we want to become one of the best companies in the world and a desire to be part of this team—it sounds easy!

787. Do you place contracts with universities and therefore get access? How do you come across them?

A. We go beyond universities. We go to the schools now and we are starting to interview sixth formers with a view to funding them through university with arrangements that they will visit us during the vacation and will work for us, then

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DR J L LEONARD

[Continued]

[Lord Kearton *Contd*]

hopefully will join us if we want them, although there is no obligation on either side when they emerge with their degree.

*Lord Taylor of Gryfe*

788. No obligation on either side?

A. Right. There is a moral obligation on their part really.

789. You say you consider "the mechanisms for technology transfer from HEIs, Research Councils and public laboratories to manufacturing industry to be largely ineffective." That is a very devastating statement. How can this be improved, or should we forget all about it? There is a great deal of educational input but you are saying it is not being transferred, it is not getting across?

A. The problem is, the people are not transferred. We are concerned with the application of technology. It is extremely unlikely that any government establishment will come up with a device which we can go out and sell to someone; they may come up with some technology which is useful, but without the man who has worked on that technology and knows its ins and outs we cannot adequately take it over. There are several things within, say, the Civil Service which lead to problems. It would be very nice if there were not the security of tenure arrangements so for example, bring in civil servants for a few years to use whatever they had done somewhere else and have them do it with us.

*Lord Kearton*

790. Do you transfer any academics at all?

A. We do a little of that. The better ones, in fact, leave academia ultimately and come and join us. They find it very difficult to go back again. The ones who are born academics do go back and are not, in fact, a lot of use to us.

791. What is their motivation? Not the pursuit of knowledge? They just want to see some practical results?

A. The academic pursuit of knowledge, and the outcome is not necessarily of use to anyone. We are interested in things of use to people.

*Lord Clitheroe*

792. You clearly do work very closely with your customers. How do you get the feedback that you need? Can you expand a little bit on that?

A. The story is different in different places. We are international now. Ideally it would echo the original philosophy. The original philosophy was that we had engineers to do the selling. When we started the business we had four PhDs going round the country knocking on people's doors with the first product saying "Look what we have got. Isn't it wonderful?" The customer would say, "It looks quite clever, put it on the machine". Then our sales engineers would

realise it did not really fill the need and that, if you did something a little bit different, it would be absolutely perfect. So you gradually bring in awareness at customer level of what you have to do next to give him something which is world-beating. We have been very successful at doing that on several occasions.

793. Do you extend that backwards in the chain to your suppliers?

A. Yes. We are more and more working very closely with suppliers now and, in fact, like other companies in the field, are dropping the numbers of suppliers so that we can work closely with a few in order that what they do will meet what we need.

*Lord Vinson*

794. Your track record has been remarkable, if I may say so, coupled with a high profit margin. No doubt underneath that net profit margin there is quite a lot of research and development going on quite well and self-financing, and you still show a useful surplus at the end. If you could wave a magic wand and were asking the Government to change practices of patent law or taxation, or the Inland Revenue approach to certain matters, are there any inhibitions in those areas which you would like to see altered so as to further the development of companies like yours?

A. At the moment not really. From time to time things come and bite us. I remember once being very concerned about section 79 of the Finance Act 1972, which is to do with shareholding and capital gains being taxed as income, at a time when tax was at 98p in the pound. It has gone away at the moment but perhaps might return. I think what has concerned me most over the years is the sheer change you get when a different government comes in. Companies and management heal themselves against tax, so that if a new tax law comes in and there is a way round, we will employ experts to try and find a way to minimise the pain and the effort of having to do this every time we have a different flavour of government. That is the worst thing about the whole situation, from our point of view. We need stability.

795. Taking the present regime, there was a substantial change in capital allowances about four years ago. Was that inhibiting at all on your research policy and things like that?

A. No. We have tried to do what we should do in order to expand the business and if it costs us more, sometimes it does.

*Chairman*

796. Do you write off all your development expenditure each year?

A. Yes.



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DR J L LEONARD

[Continued]

*Lord Kearton*

797. I have a feeling your company, Eurotherm, existed 25 years ago?

A. It did. It is our 25th anniversary this year.

798. You said you started up with four people?

A. Yes.

799. The record of the last ten years is while you have been Chief Executive?

A. Yes. I was one of the founders. There were four of us. Jim Hartnett was the original Chairman, and I was Chief Executive at the time we went public.

*Chairman*

800. You mentioned just now that your sales engineers work closely with your customers and help to improve the product. Is that what you meant in the note, that so far as development strategy and advanced product design are concerned, that is now carried out in collaboration with big companies on a world-wide basis? Is that true? Is that an accurate reflection of what you do?

A. Yes, but it needs explanation. What happens is that our companies are independent. I should perhaps spend a bit of time on the background. The company, Eurotherm, was formed when in 1965 we broke away from an American company called West Instrument. We were an English start-up founded originally by an American entrepreneur, who was subsequently killed, and a conglomerate took the firm over and the rules changed. We had been doing what we thought was right in our marketplace and all of a sudden the new "corporate giant" said, "We know what you ought to be doing. Do not do any development in your country. We know what should be done," and, of course, they did not. We know the ways of our market. We felt when we started Eurotherm that we had to be careful. We did not try and assume we knew what was best all around the world and tell the American companies, for example, what they needed for their market. We thought they ought to know best and that is the way we have developed. So when we started Chessell in the United Kingdom we had an organisation. We then started the Chessell organisation in America but did not make it subservient or subsidiary to Chessell in the United Kingdom. We made it a separate company which had its own creativity and the resources to work under, which certainly we encouraged, and I remember at several meetings arguing with Chief Executives about what they should be doing, and we try and get agreement so that there is not too much overlap of activity.

801. It is collaboration and finding out what your customers want before you start developing it?

A. That is important to us.

*Lord Clitheroe*

802. Could you tell me, have you grown by acquisition during this period? There are four different companies. Did they develop from your original business or did you acquire them?

A. No, they have all developed out of the original business. It is self-generated growth.

803. Do you feel strongly one way or the other about the merits of self-generated growth as against acquisition?

A. I think acquisition can help us on the way, but generally I would say, being the sort of person I am, I like the self-generated sort. Acquisition is an extremely dangerous thing. A very low percentage of acquisitions are successful and, of course, your culture starts to change as you bring in foreign bodies, as it were.

*Lord Taylor of Gryfe*

804. In your overseas activities do you do anything under licensing arrangements or do you handle your entire overseas activities direct? Do you license some of your activities to companies?

A. No, they are all direct. I did look at licensing arrangements in our earlier days and thought we would lose our market lead because we enabled a foreign body, as it were, to get into the marketplace and we tried to guard against that.

*Lord Kearton*

805. I think you said you have 2,500 employees or thereabouts?

A. Yes.

806. How many of those are graduates?

A. I do not know the answer but a high percentage. Out of 2,500 it is probably 1,500 or something like that.

807. As high as that?

A. It is very high.

*Chairman*

808. In the technical field, scientific and engineering?

A. Yes.

809. Could I follow up that one. What proportion of your development activity roughly is related to improvement of products and how much is innovation from scratch, as it were, on an entirely new range of products?

A. I would think about 70 per cent. is improving what we have done in the past, incremental development, and perhaps 30 per cent. is something really entirely new.

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DR J L LEONARD

[Continued]

[Chairman *Contd*]

810. A big step forward?

A. Yes.

*Lord Kearton*

811. Is that because of customer need or because you are keeping a general eye on developments in your field? Both, I suppose?

A. It is basically our perception of how we can give the customer what he wants. The customer does not know what he wants because he does not know what is available that he can benefit from, so you can do something for them.

812. So you use best practice in one company and act as transfer to other companies?

A. I am not sure I understand the question.

813. You have collaboration with companies around the world and companies vary in the way in which they apply your own ideas and processes, but you must be getting a feedback from your customers which you presumably disseminate for the benefit of all your customers?

A. Yes, and, of course, some do worry about it. We are collaborating with a very large British company at the moment which is dominant in its field and is afraid we will transfer the technology to a Swedish company, so we have the corporate jiggery-pokery of having separate companies handling their business, so that confidentiality is absolutely essential.

814. If that sort of transfer was provided, it would be to everyone's benefit, would it not?

A. Not necessarily. They feel the instrumentation part of their equipment is small there but it gives them a lead in selling their products.

815. From your figures you cannot do much manufacturing yourselves at all?

A. We assemble. We subcontract most of the actual fabrication.

816. If I heard you correctly, out of 2,500 you said 1,500 or thereabouts are graduates?

A. Yes. The actual assembly is done by maybe 400 to 500. It is quite small, girls at benches.

817. So the direct labour content is very small?

A. Yes, and getting smaller, because we are being forced into automatic assembly because the components are getting so small they have to be machine-assembled.

818. But you are really a brains company in every sense of the word?

A. I suppose so, yes.

*Lord Vinson*

819. Coming back to the R&D question, it seems to me that the character of your company is marvellous. You say, "To hell with the obstacles, let us get on with this function", and that is the only way you can battle through ultimately, but you will appreciate why we are here is to try and sense what those obstacles are. You mentioned City attitudes here are extremely inhibiting. Training or the dearth of scientists might be another obstacle. If you could wave a magic wand, what would you like to see that would enable your business to grow more effectively and faster, or others like it?

A. I do not think there is a simple answer to that. With regard to the City, I am not sure anyone could do what we would like, which is to stop them potentially attacking us.

*Chairman*

820. Attacking you in what sense?

A. In that, for example, GEC could decide it wanted to strengthen its microprocessing and process control and could easily eat us, in which case it would stop the thing in its tracks.

821. Takeover?

A. Yes, and I think business has been badly damaged by this takeover business.

*Lord Vinson*

822. That is what we want to hear.

A. I am convinced it would not do us any good at all if we put everything into one basket. I do not believe, in my sphere, bigger is better. It may be if you are making cars, I do not know. We have to keep one eye on our share price, which is not good. It is not bad but it is not good.

*Lord Clitheroe*

823. It is distracting?

A. And there is a definite risk that we will be stopped in our tracks. I would like, before I retire, to see us up to the £1 billion or at least the £½ billion level and we could become a world force in process control. There are no British companies that have our strength in process control and the Americans are starting to slip, so we could start to dominate.

*Chairman*

824. You believe the threat of takeover restricts your rate of growth to some extent, because if you spend too much on development your profits go down and you are vulnerable?

A. Yes, that is right. I think you put that down as a potential question. Our policy is to invest steadily and we have grown on average 20 percent per annum since we started. That is done by looking ahead, seeing what we want to do, what we need to do, and we hire engineers to fill a development rôle. This



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DR J L LEONARD

[Continued]

[Chairman *Contd*]

means the overhead increases. If we do not get the sales in, particularly after we have increased the overheads—because you do not do it steadily; it tends to come in little chunks—we then reach times like we are hitting now where the sales have not increased as much as we expected, the profits suffer; and the first thing that happens is that shares get sold, the price collapses, and we do not quite know what is going to happen next. You look with great caution at the rate of investment frankly.

*Lord Taylor of Gryfe*

825. You say it is an inhibiting factor having the City look at you: if you are successful they may take you over and if you are not successful they may take you over also. This inhibiting factor has not been reflected in the record of your company. If you look at your turnover and your profit before tax, you have gone like steam all the time despite what you say about figures in the City being ready to pounce. I really think that this is a bit of a myth; it is the fashion to say that the City is the great enemy of businesses.

A. All I can say is, I am concerned about it. It has occupied the Board from time to time as to how fast we can grow. The other factor that I think is of concern with the City is that most of our firms are owned by institutions where the person doing the investment is an employee who is judged successful or not successful by the gain he makes. Therefore, if a good bid comes along allowing him to make a gain, he is extremely unlikely to have a loyalty which will override that. There is no reason why he should have. If we take the example of an American company, Foxborough, it has been dominant for several years now in the industry. It has had several years of decline and has made a profit one year in the last four or five, but the share price has not moved at all because it has friends of the family and family shareholders and they passionately believe in their company. It is Foxborough, Massachusetts, they all live round there, it is their company. We seem to be losing that loyalty or integrity.

826. You are talking about a company that has not done particularly well. Does it not require the threat of takeover to make it do better?

A. That is as may be, yes, but that is Foxborough. What I am worried about is that our shareholders do not have that sort of loyalty. Maybe their loyalty is misplaced, perhaps they ought to come and be loyal to us.

827. You are doing so well I think people would be particularly loyal to your shares—they were 220 or something this morning.

A. About as low as they have been for quite a long time.

*Lord Kearton*

828. You do not publish your R & D figures in your report. Why is that?

A. Because we do not know what they are. I believe we are going to have to next year so we will find out. We spend about 10 percent of sales on R & D and the rest on engineering. How you define it as one or the other is sometimes a little difficult.

Lord Vinson] You will have to bodge up a figure like everybody else.

*Lord Gregson*

829. What is your P:E rate?

A. It is 0.9 I think, something quite low.

830. You are pretty vulnerable in your sector then?

A. Maybe the argument is right and we are not. I am not aware of a bid at this moment. It may be going on while I am away but — Theoretically we are vulnerable.

831. It is not a good basis for developing the company.

A. That is my opinion.

*Chairman*

832. On the whole, your figures show clearly that you have been successful in achieving what you might call short term growth each year with longterm growing profitability and turnover through investment in new and improved products. You seem to have struck a very good balance.

A. I think we decided many years ago we could afford to grow at 20 percent per annum. If we did that the cash ratios would be about right, the profitability would come out at something like 10 to 12 percent of sales. It is the right sort of ratio for our type of business.

833. Is it your diversification between the five main product groups that helps you to keep this balance? One may be up a bit one year and one may be down, but on the whole —

A. Yes, that is true. The other aspect is that we are international so that at the moment we are finding the United Kingdom and the United States in the doldrums but the Continent is booming, which is quite helpful.

*Lord Kearton*

834. Do you have linguists on your staff? How do you deal with the overseas business?

A. We make them all speak English! The overseas companies are staffed by locals. We sometimes send an expatriate out to start the business but we rapidly hire people and leave them in charge.

835. It comes down to your skill in choosing people?

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DR J L LEONARD

[Continued

[Lord Kearton Contd]

A. Yes.

*Lord Vinson*

836. When I went from a private company to a public one, granted only employing 1,000 people, my attitude changed from one of "We will invest now and generate profits over five or ten years if necessary" to "We have got to look over our shoulder, we simply have to maximise profits more in the shorter term". I think what you are trying to say is that in a sense, if we had a greater sense of perspective, like the investors who are bank based in France and Germany, we would reach a stage where we would give a more longterm approach to it with projects of an innovative type. If you did that you would probably be looking at it to a greater extent than you can afford currently.

A. I think the answer is yes, but we try not to make it too strong and yet try not to be too inhibited by the environment.

*Lord Chorley*

837. You used the phrase "We can afford to grow at 20 percent per annum", but what does "afford" depend on?

A. It depends on cash. It means we would be roughly cash neutral in normal circumstances, and it means we would normally expect to be profitable at the right level with that sort of growth.

838. So the primary constraint is cash flow and how much you could afford to put into capital investment?

A. We are not a capital intensive company. The main need so far has been buildings. We do not have to buy those.

839. So it is cash in.

A. It is working capital really, receivables and payables.

*Lord Kearton*

840. What is your balance sheet roughly?

A. I do not know the answer to that, I am afraid. It is of the order of £40 million.

*Lord Chorley*

841. Is trained manpower a constraint? If you had no cash flow constraint on you, what would the next constraint be?

A. Management. There is a manpower problem. It is very hard to find people whom we can move into the senior levels. We grow them through the company but we are growing so fast the situation is that they do not grow up fast enough.

*Chairman*

842. Technology management?

A. Yes, but that coupled with business management. I think in this country we sort of teach

technology but not business together with it. People sometimes learn technology, then go to business school. That does not seem to work.

*Lord Kearton*

843. Do you take on Masters of Business Administration?

A. We have done, but there has not been anyone who has been very outstanding.

*Lord Chorley*

844. We have not talked about competition other than the fact that you said there were no competitors in this country. Where does the competition come from? Does the nature of the competition inhibit innovation, or does it spur innovation?

A. It definitely does not inhibit it, it spurs it if anything, and you see people getting quite angry. Yokogawa, the Japanese controls company, is becoming a serious competitor worldwide and is investing an awful lot into trying to attack us in various markets. Fortunately, it is not so far very good at marketing. I understand people have to refer back to Tokyo for decision-making, which does not do them any good at all. In Germany Siemens are making a go at our markets and are a force to be reckoned with. In America it is small companies.

845. The competition is on innovative products as opposed to costs, is it?

A. Yes. I think companies like Yokogawa have the benefit of being able to use products from other bits of their company. For example, they have a recorder with an electric motor in it which was designed for a totally different purpose.

*Lord Kearton*

846. You obviously provide a stimulating environment for your people and give them responsibility, as you say in your written evidence. Do you have special financial incentives for them, too?

A. Yes, we are open to all suggestions here. They do not all work. We try and give people shareholdings in the separate businesses. Again the City is not wild about this and I understand its reservations. We have "Save as you Earn" schemes, we have profit-sharing schemes and are also looking into royalty arrangements, where people will get quite big rewards from the sales of products they worked on.

*Chairman*

847. Have you had any major external fund-raising over the last ten years or do you finance yourselves internally?

A. We did a one for seven rights issue in 1982 on the basis that the share price was so high we thought it was a shame not to. I think the P:E was 30-something.



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DR J L LEONARD

[Continued]

*Lord Taylor of Gryfe*

848. What was it?

A. The share price, about what it is now, when the company was a quarter of the size.

*Chairman*

849. If you did that again would that help your rate of growth?

A. No. I do not think we are cash-limited. Our borrowings are reasonably low and I think cash is under reasonable control. We could always raise cash by selling a few buildings.

*Lord Kearton*

850. I am fascinated by the fact that you said you are a people company. That is most encouraging. Is there any significance in the name of your Head Office, which is called Leonardslee?

A. No. It is a house we bought. It is 100 years old. It was built in the lee of St Leonards Forest, and I am not a saint yet!

*Chairman*

851. We are all very impressed with the growth you have achieved in a fairly high-technology field. Is there any way you could help us to answer the question: if you could do it, why cannot more companies do it? My feeling—and I am sure many of the Committee share this view—is that if a much greater proportion of British manufacturing industry could grow in the way you have done, we should not have the balance of payments problems we have.

A. I think it comes down to education. I think I have had a gradual awakening on this. One of my colleagues when we started the business had no education at all. I think he had a High School Certificate and no-one had told him he could not do things. I think our education system is a bit inhibiting in this respect, and I have gradually come to realise that if you go for it you can get it and I am not sure people understand this. They do go through a system in school and they go through a system in university and expect to obtain a position in industry, and you need rather more freedom of thought in this respect. I think of one American initiative which I have seen attempted here where, for example, schools form mock companies so that the children appoint directors and they have a pretend product and this goes right through school life in America.

852. There is a scheme for that here.

A. It is starting.

*Lord Vinson*

853. 3,000 young enterprise groups.

A. I tried to get one going in the Worthing area and the schools are not interested. Their children went in for nursing and secretaries and lawyers. I must be careful what I say!

*Chairman*

854. I think you are implying what you want is a more entrepreneurial spirit of get-up-and-go?

A. Yes.

855. I think at the beginning you were saying one of your problems is the shortage of good engineers and scientists?

A. Yes. I want them with the entrepreneurial spirit.

*Lord Kearton*

856. You want trained technical people with an entrepreneurial spirit as well?

A. Yes. None of my education had any business content. I did not know what profit was. In fact, I think the word "profit" is rather a nasty word in this country.

*Lord Gregson*

857. It is south of Watford. You want to look north of Watford!

A. We may well do that.

*Chairman*

858. Thank you. I think it has been a most interesting discussion and, if I may say so, a very encouraging one, both on your manpower side and on the financial results you have achieved in an engineering manufacturing company.

A. Thank you very much indeed.

859. Congratulations and I hope you continue your growth to your £½ billion in five year's time.

A. We will try.

MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 23 May 1990

**PRUDENTIAL PORTFOLIO MANAGERS LTD**

*Mr H Jenkins and Mr H Jones*

**KLEINWORT BENSON INVESTMENT MANAGEMENT LTD**

*Mr B Siddons*

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WEDNESDAY 23 MAY 1990

Present:

Butterworth, L	Gregson, L
Caldecote, V (Chairman)	Kearton, L
Chapple, L	Vinson, L
Clitheroe, L	Whaddon, L
Erroll of Hale, L	

**Letter by Prudential Portfolio Managers Limited**

Thank you for your letter inviting comments on innovation in manufacturing industry.

Our perspective on this subject arises as a result of our activity as the investment manager of savings funds which invest in the share capital of companies which are quoted on the UK Stock Exchange.

We regularly discuss the progress of our investments in particular companies with the executive directors who have responsibility of managing these companies on behalf of all their shareholders.

Our investment decisions in respect of a particular company are generally based upon our expectation of earnings growth for that company. We believe that any company's well-balanced investment programme designed to achieve satisfactory progress in earnings per share should include a continued commitment to innovative investment. However, we also believe that it is appropriate for the executive directors of a company to decide upon the appropriate level of such expenditures, taking account of the particular industrial opportunities which they can perceive.

Clearly such investment in innovation will depress published earnings in the very short term, but we believe that successful company managements do achieve a reasonable balance between investing for the short and long term.

Correct evaluation of companies by the stock market does depend upon managements being reasonably forthcoming when describing their investment plans and future expectations. In the field of innovative investment, worries about giving too much information to industrial competitors can arise, and there may be no easy answer to this constraint.

We do believe, however, that executive managements who regularly inform and meet their shareholders do have the opportunity to seek support for innovative investment.

Contested takeover bids mainly arise when an existing company management may have been perceived by a predator as failing to maximise the returns upon shareholders' resources. Our discussions with management during such takeovers are thorough, and we do attempt to ensure that we have a complete picture of future earnings prospects from all sources. We generally support incumbent managements in good standing, with the constraint that if an extremely high price is offered we must take full account of our duty to recognise the best interests of our clients whose investment funds we manage.

I hope this brief letter is helpful to you and would be pleased to discuss the subject further if invited to do so.

H R Jenkins  
17 April 1990

**Examination of Witnesses**

MR HUGH JENKINS, Chief Executive, and MR HUW JONES, Head of Corporate Finance, Prudential Portfolio Managers Limited, called in and examined.

*Chairman*

860. Good afternoon. Thank you very much for the memorandum you sent us; we read it with great interest. Is there anything you would like to add to that memorandum?

(*Mr Jenkins*) No; we stand by it.

861. If I might kick off with the first question, what are the main factors which influence your

investment decisions? In formulating your investment strategy, how do you achieve a balance between maximising your returns and minimising your risk?

(*Mr Jenkins*) I think we start from the standpoint of looking at the nature of our liabilities, which are essentially long-term and obviously are in real terms, in that people want their savings protected not only against inflation but also against rises in wages. We



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MR H JENKINS and MR H JONES

[Continued]

[Chairman *Contd*]

then look round for forms of investment which might best match those real liabilities, and we come to the conclusion that equity of one form or another is best suited to match those liabilities, and by that I mean either property investment on the one hand or ordinary shares. In choosing ordinary shares, which make up a very large part of our portfolios, we look for companies which are essentially well managed and have good prospects for future growth in order to match the expected return and our future liabilities. Our view on those investments has to be long-term. We look to diversifying our individual risks through a portfolio of shares so that the volatility which we might experience in the case of any one company might be washed out over a much longer term. Therefore, we seek diversity, accepting that in some instances individual shares might have substantial risks attached to them and a degree of volatility but will nevertheless provide us with a good long-term return.

862. You mentioned long-term liabilities. Are you investing entirely for the insurance part of your activities to meet your insurance liabilities, or do you have private portfolios as well?

(*Mr Jenkins*) We do not have individual private investors as such. We can categorise our investments as being insurance-type products, which essentially are term savings, unit trusts, pension funds and we also manage segregated pension funds on behalf of occupational pension schemes, so we have a very wide range of clients. We are normally charged with managing those funds on a discretionary basis, but we are nonetheless held accountable to the various range of owners, if you will, through various boards of directors, and indeed through trustees in the case of segregated pension funds.

*Lord Kearton*

863. Can you remind us of the total amount of funds invested?

(*Mr Jenkins*) The total funds which the Prudential manage from London amount to £35bn, of which some £5.2bn is represented by property, approximately £4.9bn is represented by fixed income-type securities, and the remainder is made up of ordinary shares. Approximately, £18bn-£20bn is invested in ordinary shares within the United Kingdom.

*Lord Gregson*

864. In view of what you say about your studies before investing, does that mean you never stag?

(*Mr Jenkins*) We never stag, no. Essentially, if we decide to make an investment it is an investment for the longer term; we are not in the business of jobbing.

865. You do not buy shares early on in firms which are in play?

(*Mr Jenkins*) We do not; that is taking a very short-term point of view. I would add that we have

approximately 800 companies in our portfolio in which we invest, and in approximately 250 of those companies we have what in the old terms was called a declarable interest, which as you know has subsequently been changed. Therefore, that is a substantial number of companies in which clearly we have indicated to the world we have a long-term commitment in the sense of having in excess of 5%.

866. That leaves a lot which are not?

(*Mr Jenkins*) It leaves a lot which are not, but nonetheless our commitment is to the long term.

*Lord Vinson*

867. When you invest in companies, are you a prime mover in the investment, or do you get involved in syndicated investment?

(*Mr Jenkins*) The occasions when we might be involved in syndicated investment perhaps arise more frequently in the case of Prudential Venture Managers. We have approximately £200m invested in unquoted companies. Where a company comes to us and seeks support, we ourselves might choose to take 5% of the company, and we might then, along with colleagues in the venture manager industry, syndicate that investment. By the same token, there are now hundreds of firms in the venture manager industry, as you know. We might take a piece of that transaction as well, so there is quite a strong community of interest.

*Chairman*

868. That applies to newly-established companies?

(*Mr Jenkins*) Yes, or, for that matter, to companies which choose to go down the management buy-out route.

*Lord Erroll of Hale*

869. I am very interested in what your relationship would be with companies in which you invest. If they come along to you for more funds, particularly for some new innovative development, do you give them perhaps priority treatment, or better treatment, than you would a complete stranger, or do you regard each individual request entirely on its merits?

(*Mr Jenkins*) I think it is true to say that any particular case which comes before us we must treat on its merits at the time. In the case of both quoted and unquoted companies, we do have a very strong relationship with the companies in whom we invest. We at the Prudential are very proud of the relationship which we have established with companies over very many years. Apart from our research and analysis activities, we have a corporate finance team headed by Mr Jones, who accompanies me today, which is responsible for our corporate financing activities and is involved in monitoring companies and maintaining a regular dialogue with them over the development of their business

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MR H JENKINS and MR H JONES

[Continued

[Lord Erroll of Hale *Contd*]

strategies. In the case of a quoted company, usually the company will be accompanied by its merchant bankers, and it is usually a prelude to a rights issue, where they might be seeking our support to underwrite that rights issue. Those monies might be needed for a wide range of activities, ranging from corporate acquisitions to the requirement for funds for organic growth in connection with an individual project which they might have on hand.

870. Would the relationship be the same as that which you have with savings funds whose monies you are investing, or would it be different?

(*Mr Jenkins*) We adopt the same approach to all the funds under management; it is a unified process. It is the same team of people, because we maintain a range of 12 UK research analysts, each of whom is responsible for a particular sector of the share index and a range of industry. As I say, that is supported by Mr Jones' team on the corporate finance side so we can provide continuity and uniform treatment.

*Lord Vinson*

871. Have you got a policy on contested bids?

(*Mr Jenkins*) Yes, we have. We went to some trouble this year to include it in our report and accounts. By philosophy, we are minded to support incumbent management where those managers have displayed a record of good management and good housekeeping. I think it is also incumbent on management to play by the same rules also, that is, to consider both the short and the long-term interests of the shareholders. We are very keen to monitor management and also to be participative in the way in which they handle their investment and corporate strategies. If I may elaborate our approach a little further and try to put some numbers to it, in 1989, which as we all know was a fairly active year for corporate takeovers in this country, there were approximately 84 takeover bids for companies which were in our portfolio. In 79 of those cases we chose to accept the advice of management and vote with the company.

*Chairman*

872. Against the takeover?

(*Mr Jenkins*) Yes.

*Lord Gregson*

873. Would the same attitude prevail amongst other institutions?

(*Mr Jenkins*) I cannot speak for other institutions, but we certainly have a strong inclination where management has done its job to support management. To go back a little further to 1984, since then there have been 490 takeovers, and we have chosen on only 25 occasions to ignore the advice of management.

*Chairman*

874. If you thought there was no particular advantage to the activities of the company concerned you might forgo a medium to short-term profit because of the increase in share price because you believe in the future performance and success of that company?

(*Mr Jenkins*) Because we believe in the investment philosophy which the company put to us both in the lead up to and during the time of the takeover bid.

*Lord Gregson*

875. A lot of institutions do claim to support the incumbent management; if you like, this is a familiar cry in the City. In that case, why is it that so many hostile takeovers succeed in this country? They occur here seven times more than in any other country in the European Community. Why does it happen in that case?

(*Mr Jenkins*) I cannot speak for the comparative numbers within Europe, but I think the UK's record is not bad.

876. Compared with America, I accept that, but compared with Europe it is lousy.

(*Mr Jenkins*) I accept your comment; by comparison with North America we are a lot better.

877. Why do they succeed if institutions like yours say they always support incumbent management?

(*Mr Jenkins*) As I say, I cannot speak for others; I can speak only for our own record and our own particular viewpoint.

*Chairman*

878. Do you find that the decisions you take to support the management and forgo a medium or short-term profit are usually wise decisions?

(*Mr Jenkins*) They are always long-term decisions, and I hope we have taken the right decisions. Sometimes it might turn out that it would have been better to take a short-term view, but by and large in the long-term our decisions have been right.

879. You are not regretting it up to date?

(*Mr Jenkins*) No.

*Lord Vinson*

880. You cannot always influence the decision; you may vote one way but the opposite still happens?

(*Mr Jenkins*) Yes, absolutely.

*Lord Erroll of Hale*

881. Do you jog backwards and look at the decisions you took 10 years ago to see if in the light of subsequent events they were the right ones?



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[Continued]

[Lord Erroll of Hale *Contd*]

(*Mr Jenkins*) Usually other events cloud the vision; there are always other factors to add to the equation, so you can never compare like with like given the passage of time.

*Lord Kearton*

882. Do you ever take the initiative in talking to management; in other words, do you say to them, "We are not very happy with the way you have been performing"?

(*Mr Jenkins*) Frequently. The Press usually give us a bit of a hard time suggesting we are not interested in doing anything, when in point of fact much is going on which they cannot see. They get somewhat irritated and tend to make more of it, but we find that by and large stealth and doing things quietly usually produces results and management is much better placed and disposed towards a proposition from us for change.

883. Do you do this on your own or in concert with other institutions?

(*Mr Jenkins*) Sometimes alone, but on other occasions with two or three other institutions with fairly large holdings.

884. I was talking about privileged information gained by somebody that you were thinking of selling your shares?

(*Mr Jenkins*) Frequently, it might not be in our best long-term interests to do that.

*Lord Chapple*

885. Have you nominated directors of companies in which you are investing?

(*Mr Jenkins*) We might make suggestions as to possible non-executive directors if we are asked for names, but now there are many places from which nominations can be drawn—PRONED and other people like that.

*Chairman*

886. To take up Lord Kearton's point about privileged information which might be obtained by somebody from your approaches to the company, might he forgo the ability to sell shares because he had privileged information like that?

(*Mr Jenkins*) We issue an internal list of restricted companies, which is updated daily, of those companies with whom we are involved in discussions, and that is made known to those involved, and such activities are prohibited in those cases.

*Lord Kearton*

887. You say you have £35bn under fund management. To what extent do you invest new money; in other words, rights issues, loan issues, and so on?

(*Mr Jenkins*) It depends on which particular year you take. You usually find that rights issues go in fairly substantial cycles. We have not had a significant year for rights issues for some little while.

888. But my impression is that the amount of fresh capital that you put into business is not really very great?

(*Mr Jenkins*) By comparison with new money invested in existing shares, that is absolutely right. We are dependent on companies coming to the market. It is rather like pushing on string; unless they come to us with requests for capital there is nothing we can do to stimulate it.

*Lord Whaddon*

889. It is said by some people that German financial institutions in particular take a longer view of industry than British ones and as a result are more successful. Is this your view?

(*Mr Jenkins*) We are always being told that the Germans and Japanese have got it right in terms of their relationships. It happens to be the case that there are many cross-holdings both in Germany and Japan, and of course in the case of Germany there is another relationship—one of a banker. I do not think I would like to add a great deal to that.

890. Do you find you are moving your money increasingly out of the United Kingdom for the purposes of investment and, if so, why?

(*Mr Jenkins*) I would not say "increasingly". We have approximately 25% of our equity investment in an overseas form. There is no great weight at the present time to increase that proportion any further.

*Lord Butterworth*

891. How do you view company investments which depress published earnings in the short term?

(*Mr Jenkins*) It is probably fair to say that it would be wrong for us to expect that every new investment a company makes will increase the amount of earnings flow as a result of that investment, and the chances are that it will be at the lower rate of return than a mature portfolio of existing investment. We accept that in the short term a particular investment could depress earnings. On the other hand, if management has made the correct decision it will be taking a forward view, and one would expect that shortfall to come through as an increment in later years. Providing management can articulate the reasons for making that investment, which might in the short term depress earnings, we would be very supportive in the making of that investment.

892. Are you in favour of companies being required to publish in their annual accounts what they spend on research?

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[Continued

[Lord Butterworth *Contd*]

(*Mr Jenkins*) Very much so. There is a wide variation in what is published; it might amount to a one-line item, to two paragraphs or a complete book.

*Chairman*

893. SSAP13 will require companies in future to disclose it?

(*Mr Jenkins*) Yes, without doubt. I was purely talking about the current position.

894. But do you think that is a reasonable requirement?

(*Mr Jenkins*) We would wholly support that measure. It will give us a firm handle with which to discuss these matters with management in terms of the percentage of their total turnover that is spent on R&D.

895. Do you think it is satisfactory that that should not be a legal requirement under the Companies Act but simply an SSAP?

(*Mr Jenkins*) I think we have to allow some degree of discretion. We usually find that industry will comply and provide what is needed.

*Lord Gregson*

896. It has not always been the case in the past that companies have complied with SSAPs, as you know.

(*Mr Jenkins*) I accept that. I think that in this case there will be sufficient interest in what comes out of it, and indeed I think it is in the interests of the company and management to disclose as much as possible, because we believe it has an influence on share prices.

Lord Butterworth] It is sometimes said that the effect on share prices is different in New York from London. You publish the amount spent on research in New York and it proves to be advantageous to the share price, whereas if you publish how much is spent in London, by and large it is disadvantageous to the share price.

*Chairman*

897. We are talking about research and development.

(*Mr Jenkins*) Yes. I would not like to quarrel with the examples which you give, but I think there are plenty of examples in the UK of companies which provide a great deal of information on R&D and do get a benefit from a better multiple than those companies which produce very little in the way of information and disclosure about R&D. It comes back to the issue: What is R and what is D, and what is the nature of D?

*Lord Vinson*

898. Asking companies to publish their research is not necessarily going to improve either the amount expended on research expenditure or the quality of

it. It might air the subject, but there are other factors which make a company wary about advertising too much what they do on that front. The tax treatment has been broadly tightened up so research is allowable; before that, there was every reason for not publishing it because it otherwise hammered your profits. Do you think that if we can get a general movement towards more research it is likely to happen in an atmosphere which is very heavily biased in favour of contested takeover bids? It appears that the pressure of maximising short-term profits today forces companies to do less long-term development and this problem arises because of the whole nature of the market and the pressure to keep the price up in the short term to fight takeover bids. If all investors had the perspicacity and wisdom of your own company in terms of its approach, perhaps this pressure would not exist. The fact remains that I imagine nine times out of ten your support of management is overruled by those who are out for a quick buck. Do you think that airing the other side of it will create a shift in view so that the good practice you institute in terms of more long-term investment will be picked up by others?

(*Mr Jenkins*) I think the sort of area of R&D at which we are looking this afternoon might encourage management to tell us a lot more about what they are doing. Going back to my previous example of a one-line item, two paragraphs or a book, in terms of "a book" I can tell you of the remarkable information and detail that one pharmaceutical company gives. They give details not only of products which they are spending money on developing but they give a review of the things they have done in the past. I think it is important to us all to get a feel for the benefits which do come from research and development, and I think that if we as investors could see what was coming out of the research it would be beneficial to the whole community, both investors and the companies in whom they invest. Within the last couple of weeks we have talked to one company about R&D, and by and large we have discovered that companies are somewhat apprehensive about pure research. What they seem to be more directed towards are projects concerned with the development of an existing product range. They are scared of white coats but they understand the products. The more airing the subject gets, and the more investors can see the advantage to be gained from research and development, the better.

*Lord Gregson*

899. Recent figures have been published showing that dividends paid in the United Kingdom are nine times per unit the dividends paid in Japan and three and a half times that paid in Germany. Could your institution service its customers if your dividend flow was cut by a factor of nine, or even three and a half?

(*Mr Jenkins*) I think that would be somewhat difficult to answer at this stage.



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[Continued

[Lord Gregson Contd]

900. Could you?

(Mr Jenkins) I think it would be difficult, but Japan is somewhat different from all others because they have a totally different attitude towards the ownership of companies and what they pay by way of fixed dividends.

Lord Gregson] But they are an extremely successful nation; they are taking us out of world markets, and so are the Germans, and the one intrinsic feature of both countries is that they pay very low dividends.

Chairman] Low dividends in relation to their earnings?

Lord Gregson

901. In relation to turnover and earnings. They spend a lot more money on development.

(Mr Jenkins) I hear what you say, but they also have a very low cost of funds.

902. It is a question of what comes first. Which is the chicken and which is the egg? They are extremely successful countries. You could not exist and service your investors on the sort of dividend they pay?

(Mr Jenkins) That is right.

Chairman

903. Do you believe companies do enough to explain their investment strategies to institutional investors? You said that some were very good. In general, does more need to be done?

(Mr Jenkins) In general, I think a great deal more can be done.

904. What can be done to encourage companies to do that?

(Mr Jenkins) For a start, they could devote a greater section of their annual report to what is being done in the way of research and development, and also to give us a lead on expenditure which has been made in the past on research and development and what has been flowing from it, that is, how successful it has been.

905. Are you satisfied with the way that R&D expenditure has to be treated in the accounts? It is normal to write it off completely in the year in which it occurs. It used to be capitalised, but that rather went out of the window with the Rolls-Royce problems. Now the pendulum has swung the other way so the whole of the expenditure is written off every year, thus depressing earnings. Should some of it be capitalised?

(Mr Jenkins) Again, this comes back to the management decision as to the nature of the expenditure. It might be wholly right to write off that expenditure because it is unlikely to produce a viable investment at the end of the day.

906. But if management believe there is still a good chance of it providing a viable investment in the future should it be capitalised, or should they be free to do so?

(Mr Jenkins) One is bringing in a great deal of subjectivity. I am all for clarity, and therefore to write it off seems to me to be the right step.

907. You would be in favour of continuing to write it off but with a full explanation of the reason for the writing off?

(Mr Jenkins) And the depression of the earnings.

Lord Gregson

908. The Japanese write it off in three years to smooth out the lumpiness. Does that not seem a good idea?

(Mr Jenkins) I think it very much depends on the particular project on which one is embarking.

Lord Vinson

909. Does it not come back to the point that in terms of the cost of finance as between this country and Japan we are not comparing like with like? The real cost of money in this country is still very high and that must inhibit quite a lot of marginal investment, which is what the argument is about anyway. People say, "We simply cannot earn enough return on that to plough the money back because of the cost of borrowed money."

(Mr Jenkins) There is a lot of evidence tending to suggest that the reason is the high cost of funds, and also the number of viable projects which are there to be examined.

Lord Kearton

910. In your investment strategy, do you have a different attitude towards financial companies from the attitude you take to manufacturing companies?

(Mr Jenkins) No; we apply the same sort of rules. In fact, we do not see a great deal of R&D going on in financial companies.

911. What I am getting at is that the joint stock banks, in which you must have substantial holdings, have written off enormous sums amounting to several billions of pounds, and it looks as if that process will continue for various reasons. You say you talk to management. Do you talk to the joint stock banks and say, "This is not really the way to run a banking business"?

(Mr Jenkins) We have frequent talks with the banks.

912. One wonders whether the same stringency is applied to the financial institutions themselves?

(Mr Jenkins) As I say, we do have fairly frequent discussions with banks, and I think we get explanations from them from time to time.

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[Continued

[Lord Kearton *Contd*]

913. Do you make use of the resources of the Market Research Society, because one of your investments made at the height of the property market was your move into estate agents, and that has not turned out too well? Is there any element of self-criticism there?

(*Mr Jenkins*) I know we do examine ourselves quite critically.

914. The whole life blood of the future development of the country in a sense is innovation and R&D. We are told it is important to do this, that and the other, but when we come to what the financial institutions themselves regard as important it would be regarded as catastrophic if the corresponding thing took place in manufacturing industry?

(*Mr Jenkins*) I hear what you say, Lord Kearton.

*Lord Vinson*

915. I have questioned you on the influence which interest rates have on investment. We come back to the question of the capital system working on the return on borrowed money, so if you are borrowing money expensively the marginal investments you might make are ruled out. My own view is that this has a significant effect on investment in products with a marginal improvement over other products, which is how the thing used to work. There are much bigger hurdles for new ideas to leap over established products, carrying as they do the extra cost of money on their backs. What this Committee is trying to do is come up with recommendations which will strengthen our innovative base. Since that is why we are all here, can I ask you what you would do?

(*Mr Jenkins*) As I said earlier, I am sure we would all be keen that interest rates should be kept as low as possible, because at the end of the day industry has to borrow those funds, and clearly it makes it more difficult for industry to invest if it has to pay margins over LIBOR which make the hurdle for new product investment being viable that much more difficult.

*Chairman*

916. Do you think there is anything to be said for trying to find a way of bringing in a two-tier interest rate structure so manufacturing industry can get its capital at a lower rate, which would encourage innovative investment?

(*Mr Jenkins*) I think that to some extent that is a matter to be addressed to the banks. I think banks are quite innovative when it comes to structuring all forms of finance. In one way, I think it is possible for them to organise these things.

Lord Kearton] I must take you up on your remark that the banks have been innovative in all forms of finance. In some cases, we are looking at interest rates of between 22% and 29%; it is in personal finance that they have been innovative.

*Chairman*

917. It has been suggested to the Committee that financial analysts often lack the necessary technological understanding to evaluate some of the problems of manufacturing industry. Do you agree with that? Do you have an adequate number of people who understand these things?

(*Mr Jenkins*) Again, I think it comes back to people explaining the nature of the projects which industry is undertaking. We all know that some advanced forms of technology are somewhat difficult to understand, and it is very much incumbent on management to be able to explain to us what it is they are undertaking and what benefits flow from it.

918. Do you have scientists and engineers on your staff to help you?

(*Mr Jenkins*) We have a wide range of disciplines, and if necessary we can seek outside assistance, but so often it is the case that management is rather reluctant, for reasons of security of their own products, to say much about them, which makes life rather difficult for us when trying to interpret what the benefits are, and indeed what the nature of the product is.

919. You have slightly avoided my question. You said you had a wide spread of disciplines on the staff. Do they include scientists and engineers?

(*Mr Jenkins*) We do have scientists and an engineer.

920. One engineer?

(*Mr Jenkins*) Amongst our analytical team, yes.

*Lord Gregson*

921. With £35bn of investment you have one engineer?

(*Mr Jenkins*) It is one of the range of disciplines that we have.

922. It is said that the Germans employ more engineers than accountants.

(*Mr Jenkins*) But we are as well financial analysts.

*Lord Clitheroe*

923. It has been suggested to the Committee that successful management is characterised by its ability to achieve a balance between short-term profitability and long-term investment. What is your view of management performance in the UK, and do you have any comparison with management in other countries?

(*Mr Jenkins*) As to achieving a balance between the short and long term, it is rather like good housekeeping in the sense you have to balance between current consumption and saving and



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[Continued]

[Lord Clitheroe *Contd*]

investment for the longer-term. Good management would organise its affairs in a way which would achieve that balance. As far as management is concerned, we certainly witnessed during the eighties a significant improvement in the quality of management and the way in which it organised its affairs, but I think there is still room for a lot of improvement.

924. Would you say there are some other countries you would pick on as being that much better at managing the sorts of businesses we are talking about?

(*Mr Jenkins*) Again, it comes back to specific industries. I would not like to comment in detail on that.

*Lord Kearton*

925. Would you expand on your statement "considerable room for improvement"?

(*Mr Jenkins*) There is room for an improvement in British management. They have made big strides in the eighties, but there is plenty of room for improvement.

926. What specifically would you like them to do that they are not now doing?

(*Mr Jenkins*) Again, we tend to come back to specifics. We are tending to generalise. Across industry, the one thing we have noticed is an improvement during the eighties. I would not like to sit down now and say there is room for improvement in a specific company or group of companies. Overall, I think there is room for improvement.

*Lord Gregson*

927. Would you say that that weakness in management exists in the board room or amongst middle management?

(*Mr Jenkins*) I would apply that overall; it could mean the people directing the business and indeed middle management.

Lord Gregson] The Americans say that we have the best middle management in the world. It leaves only one possibility, does it not?

Lord Vinson] This may be a deeply cultural problem. It is well said that we are an industrial nation with an anti-industrial culture, and how to get the right brains into the cake-making part of the economy, as opposed to the cake-cutting part of it, is a very important question. One difficulty is that it is much easier to earn a high salary and have an easier life in many respects in the City than it is to work as a manager of a night shift in industry. The salary levels are poles apart, and yet where the fundamental good is coming from is questionable.

*Lord Clitheroe*

928. It has also been suggested that investor expectation in the US and UK is generally thought to require higher returns than in some other

countries such as Japan, but in view of the very fine performance of a number of British companies which appear to have shot up in the last few years, how does that tie in with your previous statement that there is room for improvement in UK management? How does that tie in with the improvements you can expect from either Germany or Japan?

(*Mr Jones*) In the Sunday press there was a recent survey carried out suggesting that, whereas the very large UK companies seemed to compare very well internationally—and some statistics were produced to demonstrate that point—below that tier of very large companies the same achievements were not being made.

*Lord Gregson*

929. Did it strike you that on that schedule there was no mention of R&D or product development as being a feature in terms of whether the company was a decent one or not?

(*Mr Jones*) But if the companies are not publishing statistics to demonstrate the success of what they are spending it is difficult to analyse it.

Lord Gregson] How could they draw the conclusions they did if that information was not available to them?

*Lord Kearton*

930. We find that pharmaceutical companies are regarded as a special case by investors in terms of price:earnings ratios. Why is this sector considered a special case—because of the high return on sales?

(*Mr Jenkins*) I suppose this sector is singled out because, along with a number of others, it has spent significant sums of money on R&D and has been very lucid about what the money has been spent on, and it also gives us a pretty good idea of the sorts of products which have emerged as a result of that spent on R&D. As a result, the pharmaceutical industry has ended up with price:earnings multiples well in advance of those companies which have not invested so heavily, or indeed disclosed to us a great deal of information about what profits are likely to emerge as a result of that investment. That is what makes the pharmaceutical industry stand out.

931. As far as Glaxo is concerned, Zantac is a great success story, but now Zantac is under attack by a Swedish company who have a rival product. Is that the sort of thing you follow closely?

(*Mr Jenkins*) Certainly, our analysts follow very closely the development of each and every product that the pharmaceutical industry is engaged in. As I say, they have been very forthcoming. Glaxo has produced tons of information on that expenditure, because it is large.

*Lord Whaddon*

932. Presumably, you have a doctor on your staff?

(*Mr Jenkins*) No, we do not have a doctor.

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[Continued

[Lord Whaddon Contd]

(Mr Jones) Our pharmaceutical analyst was a research scientist, with a PhD.

Lord Vinson

933. Have any thoughts crossed your mind, when pursuing your policy of backing proven existing management who seem to be doing as good a job as somebody who is likely to take over, that the Takeover Code is inimical to the stability of good management and changes should be made to the Takeover Code, or to the law itself?

(Mr Jenkins) I think the Takeover Code has from time to time been altered. As you know, most of the institutions have participated in the Takeover Panel, and from time to time this matter is considered. I do not think that at this time we would propose any major alteration.

934. Do you think that competition policy as the line where it is currently drawn is perfect, or would you like to see some changes which would endorse the philosophy of perhaps having a prejudice on one side or the other?

(Mr Jones) One area which could be mentioned is the threshold above which mandatory takeovers are made. The level is currently 30%; we would be happier with 20%, which would provide company management with a bit more control over their own destiny. We would recommend that specific amendment.

935. If you think that, have you fed it into the government machine?

(Mr Jones) We fed it into the review procedures and fund managers and others were consulted, but it was not accepted.

Lord Gregson

936. If I might put another question about product development, sometimes the gestation period is between 7 and 15 years. Given the sort of investment rate of return of between 25% and 40% which is required generally by investors today, it is virtually impossible in this country to pursue a development which will take between 7 and 15 years, compared with the Japanese return on a base rate of 5% and a required return of 7%. Does it not strike you as almost impossible for British industry to develop on that basis?

(Mr Jenkins) With lower interest rates in Japan, the Japanese have a distinct edge on us.

937. So do the Germans?

(Mr Jenkins) To the extent that they have much lower interest rates, the same thing applies to them.

938. You now have a different arrangement for venture capital investment. Would you like to explain that new arrangement, and also would you

explain what your policy is on small and medium-sized companies; in other words, your non-quoted portfolio?

(Mr Jenkins) Prudential Venture Managers has subsumed Prutec. We continue to look at a number of start-up propositions as well as management buy-outs and buy-ins. We have a fairly open policy when it comes to investing in unquoted companies, and it comes back to looking at the prospects for each individual company which comes to us. We invest relatively small amounts of money in small companies, going down to as low as £100,000. We are prepared to look at companies with good prospects.

939. You have a special unit doing this?

(Mr Jenkins) We have 25 people engaged in this full time.

940. What return are you looking for on an investment in a small company?

(Mr Jenkins) It depends on the nature of the risk involved.

941. Roughly what return?

(Mr Jenkins) We would probably be looking for an internal rate of return of about 25%.

942. That is very low by market standards?

(Mr Jenkins) It is within a range.

943. I will send all my customers to you!

(Mr Jenkins) Yes, as long as they are good long-term propositions.

Chairman

944. As part of a big insurance company, is it fair to say that your long-term liabilities go down in real terms with the rise in inflation, and therefore high inflation is to some extent to your advantage, so you have not much interest in contributing to the pressure to control inflation?

(Mr Jenkins) We are as concerned about inflation as anybody else because, as I mentioned earlier on, the largest part of our liabilities have got inflation links, if you will. Savers are looking at returns which match changes in earnings. If we look at our large pension funds, we ourselves have liabilities to match them in real terms, so clearly high inflation does not help anybody at the end of the day; it certainly does not help as far as growth is concerned. We have seen the best growth in companies under moderate inflation, and high rates of inflation are extremely damaging to equity.

Lord Kearton

945. You are in a fairly strong position to take a bird's eye view of things. Does the balance of payments situation worry you very much, or do you think we should not take it too seriously?



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MR H JENKINS and MR H JONES

[Continued

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[Lord Kearton *Contd*]

(*Mr Jenkins*) Clearly, we take an interest in the balance of payments, and it is one of the things we are concerned about.

947. One reason for our high interest rates is that we have to keep financing this great deficit?

(*Mr Jenkins*) Yes.

946. Deeply?

(*Mr Jenkins*) Yes, deeply.

Chairman] Thank you very much for coming to answer all our questions so frankly; we are most grateful to you.

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[Continued

**Memorandum by Kleinwort Benson Investment Management Limited**

The first specific point relates to the degree of activity of UK companies in seeking out external technology, especially from overseas and how they adapt to this application.

It would appear to us that UK companies have expended great efforts, and capital, in the application of technology to their manufacturing processes. This has been reflected in the significant rise in capital investment expenditure during the last three years reflected in the UK trade account given that a significant proportion of this investment has been directed towards a purchase of overseas plant and equipment. It would also appear that this has been put to good use within manufacturing industry itself reflected in a rising trend in the return on capital employed for manufacturing industry. It has also been pleasing to note that work forces have generally been willing to adapt to the application of these new technologies in the manufacturing processes.

The second point concerns City attitudes to investment and innovation.

Institutional investors, in particular the investment management departments of Merchant Banks such as ourselves, who adopt a long-term and constructive approach to capital investment regard investment in innovation as imperative to the successful future of British industry. We fully recognise that manufacturing industry can only prosper in the longer term if it is competitive and therefore innovative in its manufacturing processes. Accordingly, when forming decisions on the merits or otherwise of the companies in which we invest we pay considerable attention to the managements attitudes in this respect, and when meeting companies we are generally supportive of the capital investment plans.

Lastly, concerning the factors that influence decisions to invest in innovation.

It appears to us, from continuing discussions between ourselves and the companies in which we invest, that some of the most crucial factors influencing their decisions are as follows:

- (a) That the environment in which they operate is conducive to a satisfactory long-term return on capital employed.
- (b) Implicit within this is the required stability in their operating environment for demand of their products over the longer term.
- (c) The recognition that they will be unable to compete internationally unless they remain at the forefront of technological innovation for their products.

It is worth mentioning that a strong corporate growth environment which industry has generally enjoyed in the 4-5 years (between 1983 and 1988) resulted in the significant surge in the corporate sectors capital investment programme. Subsequently the deteriorating prospects for economic growth and instability of demand, together with illiquidity in companys' balance sheets, has increased the likelihood of a lower level of capital investment in the immediate future.

Ben Siddons  
2 April 1990

**Examination of Witness**

MR BEN SIDDONS, Head of Research, Kleinwort Benson Investment Management Limited, called in and examined.

*Chairman*

948. Mr Siddons, we are grateful to you for coming and also for the memorandum sent in by Kleinwort Benson Investment Management. I see you are head of research, and I wonder whether you would explain exactly what your function is?

A. I am head of research in UK equity and stock selection on the investment management side (not the corporate or broking side of the Kleinwort Benson group). I am wearing an entirely investment management hat.

949. Are you investing on behalf of individuals or unit trusts or big organisations?

A. All of those and others. Investment trusts are a large part of our business. We manage in total fund

terms about £10bn, which is about one-third of the Pru. Pension funds account for about £2bn; unit trusts account for about £1bn. The international sector is quite a large one as well. About half of our total of £10bn is invested in UK equities.

950. I do not know whether you heard the previous witnesses. Do you take a similar sort of interest in the companies in which you invest, in that if you think they are not performing very well you will go to the management and say so?

A. Yes.

951. Could you give us some information as to what you think about the argument concerning contested takeovers? Those who take part in them justify their actions by saying this stirs up sleepy



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MR B SIDDON

[Continued

[Chairman Contd]

management. Do you believe that is a good argument or one which is used to justify profitable takeovers?

A. Both. It obviously is used on many occasions and it is disproved on many occasions. It is the sort of argument you would expect to be used by an aggressor and hopefully defended adequately by management. If not, they are likely to fail.

Lord Gregson

952. A recent analysis comes down heavily on the failure of takeovers to improve company performance; it is so heavily biased in that direction that it almost looks as if it is a non-event.

A. I think it depends very much on the individual companies concerned.

953. But across the board what they say is that it all adds up to no real value to the country?

A. We do not make decisions across the board; we try to make specific decisions.

954. They all add up eventually?

A. Yes; it may well be true, and it would not surprise me particularly if it were true, but the decisions we would make would be based upon the merits of the individual cases, not some general view.

Lord Vinson

955. We heard the previous witnesses give us their philosophy about contested takeover bids. Do you have a corporate philosophy on takeover bids, or do you look at each one on its merits, or have you a presumption in favour of the bidder or defender?

A. We generally support the management of the company in which we have invested; otherwise, we would not have invested in it in the first place. Having said that, if a company proves to us it is likely to be more successful than the company in which we have invested, because we are fallible, then we will take that into consideration in the merits of the case.

Chairman

956. In your analyses of companies in which technology is reasonably important do you employ scientists and engineers to take part in the analytical work?

A. Our position is rather similar to the Pru's. Our people usually start with university degrees, and they are not all in economics and law, so they often have disciplines in the sciences. Obviously, we do talk to the broking community a lot, and we find that a lot of the best brokers employ people with technical disciplines.

957. How many people with technical degrees do you employ yourself?

A. I think more of our people have technical degrees than accountancy degrees, although a lot have both.

958. How many in your team would have technical degrees?

A. I would think that two-thirds have technical degrees.

959. Technical in the sense of science and engineering?

A. Yes, and we tend to go for that discipline slightly more than the Pru.

960. That is out of a team of how many analysts?

A. There are 25 individuals involved in the research process, and I know that 17 or 18 of them have technical disciplines.

961. You would claim to have a good understanding of companies with science and technology-based activities?

A. I would not pretend we are perfect. We do rely on talking to people who are more *au fait*, because our people are not obviously up to date. We talk to people within industry and the broking community. They have improved enormously over the last few years; they were atrocious in the early seventies.

Lord Kearton

962. Does the number of investment analysts employed in the City run into several hundred or several thousand?

A. I do not know the number, though I think it is diminishing pretty rapidly. The number is probably nearer four figures than three. To take the whole City, including all the institutions and broking houses, I imagine there are thousands of very mixed and varying quality.

Lord Clitheroe

963. It has been suggested that there has been a deplorable decline in relations between the City and industry recently. What comment would you like to make on that?

A. I am a little surprised at the word "deplorable", and I am a little surprised at the word "decline". I am very saddened if that is the case, because I hope the City has been recognising this problem. I agree with you that sometimes the lack of communication and understanding between the City and industry leaves a lot to be desired; it could be improved. I get the impression that people are making more effort now.

964. You think it has improved?

A. Yes, it is improving. Over the 20 years I have been involved in it, having gone through a bad patch, though it is far from perfect, I think it is improving. Most investors are more acutely conscious that they will benefit from making more strenuous efforts to get closer to companies and to be more helpful in their attitude.

Lord Vinson] Insofar as we are concerned that a takeover atmosphere is inimical to long-term research—and there is increasing evidence to show that is true—

Chairman] Do you mean research and development?

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[Continued]

*Lord Vinson*

965. Yes. It is extremely difficult to find out where you draw the line between research and development anyway. If that is true, it leads to the question whether the parameters of our competition policy are sensible or whether they are poised too much in favour of the predator rather than defender. What changes would you like to see in existing competition policy in terms of where the line is drawn to alter the position, if at all, or do we have the competition policy absolutely right?

A. That is a big question. I think the corporate sector will work it out for themselves if they are any good; if they do not work it out they will fail, and probably deserve to do so. As to the point you made about the pressure to show strong short-term performance in their defence, or indeed if they are the aggressor to show strong short-term performance, this can seriously undermine and jeopardise the future development and success of the company on a long-term basis, which I think is very regrettable.

966. Every nation has a different cut-off point or area of competition policy. The balance between dozy sheep and aggressive wolves is one that has to be hit. Have we got it right in this country?

A. Probably, we have got it broadly right, because if we are not quite right in that sector the corporate sector tries to get it right.

967. How do you mean?

A. I believe there is a correlation between the successful development of a business and its share price, and the serious institutional and long-term investors will hopefully make themselves felt or vote with their feet. I do not think the competition policy does particular harm provided it is in the best interests of a successful developing company, ie it is perceived to be successful by the shareholders. That is probably more preferable than the company being perceived by the public as being successful. I would not wish to over-criticise competition policy.

968. It has been put that the trigger point for takeovers should be 30%. Do you agree with that?

A. I think it should be nearer 20% than 30%, but I do not think it is of such significance as to make that much difference, quite frankly.

*Lord Gregson*

969. You said that you employed engineers and scientists amongst your analytical staff. A lot of graduates go to the City without first practising. Have your people got experience of industry or their particular disciplines before coming to you?

A. We would rather take one who has had industrial experience.

970. But that is not the general trend?

A. No; they usually come into the City straight from graduation.

971. All they have had is an updated education rather than experience in the field?

A. Yes.

*Lord Erroll of Hale*

972. When considering making an investment in a company either on behalf of one of your clients or on your own initiative, to what extent do you take into account their record in technological innovation? Would you have a natural bias towards such a company, or would you be rather conscious of the risks it was running? How do you assess it?

A. A lot would depend on the nature of the industry in which the company was engaged.

973. Can you give an example?

A. You have talked about Zantac and Glaxo who are obviously involved heavily in R&D. One of the many criteria is that clearly they are at the leading edge of the technology. If they are well managed they are likely to be using the right processes. For example, if you are looking at a printed circuit board manufacturer and he has not got CNC drilling and routing machines installed you are unlikely to invest in the company. Clearly, technological excellence and what they are actually using in the factory will be a very important factor in the decision.

974. If you take a company like GKN, would you rate them as highly innovative in their sphere of specialisation?

A. Yes, I think I would. The whole of that sector has seen a dramatic improvement. I would not be in a position to judge the difference between GKN and its counterparts in America, Japan or Germany. We would have to come to a view on that; it would be an important factor, because if they are going into world markets we would expect them to be able to compete successfully internationally.

*Chairman*

975. In your memorandum you say that you regard "investment in innovation as imperative to the successful future of British industry", and you go on to say that one of the factors affecting your decision is whether the environment in which the company is operating is conducive to a satisfactory long-term return on capital employed. What do you feel about the effect of high interest rates on investment decisions?

A. I think high interest rates have a very negative effect on all investments, apart from bank interest investment. Clearly, a higher return on capital is required to justify higher financing costs, and without doubt high interest rates are one of the reasons why capital investment in the United Kingdom, having been very buoyant with very



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MR B SIDDON

[Continued]

[Chairman *Contd*]

strong profit growth and an environment conducive to growth and stability, has been undermined, together with the fact that the domestic economy has suffered of late. Therefore, when looking at funding innovation, companies are understandably reluctant to commit themselves to financing what are already fairly highly geared balance sheets. Clearly, it is a very important negative factor.

976. Do you agree that ideally when activity is less and there is what you might call a slump or recession that is the time to invest in order to be ready for the upturn, when it comes?

A. Yes, and I also agree that the right time to invest in equities is when cash appears to be the most attractive in yield terms; but unfortunately people do not always behave in a logical fashion. If they are able and anxious to fund innovation when their cupboard is fairly bare they may be able to reap the rewards, but the risk is higher, and it is difficult for a management committee to agree to invest in a hostile environment.

977. Might you go along to a company in such circumstances and say, "Why do you not invest more; this is the time to invest. We will support you if you do it"?

A. I am not sure we would be quite as direct as that, but as long-term investors we would want to make sure they were keeping up with the technologies so they could compete and therefore, regardless of the domestic economic cycle, if they were competing internationally we would want to feel comfortable that they were taking the appropriate stance towards long-term capital investment.

*Lord Vinson*

978. What structure do you have for keeping in touch with companies in which you invest?

A. We see one-third of our FTSE holdings every year outside our offices, and usually once a year inside our offices. We find it is instructive to see the chairman and chief executive. We try to avoid going to broker jamborees which are usually attended by a lot of analysts and are not very instructive. We try to have a very small meeting with the company. I think we know the companies well enough to be able to say, "Can we come and see you?" That would be true for the major core holdings. As to medium and small companies, it is even more important that we know "what the managing director is having for breakfast", and therefore we will certainly see them once a year. We probably visit half of the FTSE companies at presentations in the City. We actually go and see 30%, and we will see 60 or 70 medium-sized companies, and probably 70 or 80 small companies. I would say we would be looking at 200 companies a year.

*Lord Clitheroe*

979. When you are investing, how do you manage to handle the bamboo curtain situation in terms of giving advice to companies?

A. It is not a bamboo curtain; it is a steel wall. We are vehemently independent. I accept that some years ago the City was not like that, but I would like to think we are one of the jewels in the crown. Kleinwort Benson believe very strongly there must be no perceived conflict and indeed no actual conflict, and we believe there should be no influence or pressure whatsoever on our decisions as investment managers, and if it ever did happen it would be resisted ferociously.

980. Have you found it has been practicable to think like that without major frictions?

A. Yes. It helps when you treble your profits!

*Chairman*

981. If you have private discussions with managing directors, does that not give you privileged information and therefore an advantage when it comes to share dealing?

A. We recognise that we must respect both the letter and the spirit of the Insider Dealing Regulations. I make it clear we would not expect to receive information which could be classified as inside information.

*Lord Gregson*

982. What about the Stock Exchange rules which say that one shareholder should not receive more information than another?

A. What about them? The object of research and investigation is inevitably to find out about the company in which you are investing. It would be impracticable for us to visit a company and then to publish our findings.

983. That is what the Stock Exchange expects you to do, is it not?

A. I do not think the Stock Exchange expects us to do that. I assume what they really mean is that they expect us to respect inside information which we come across. We do not come across it; we do not seek it. I cannot believe anybody would buy an asset unless he believed he knew something or had a better interpretation of the facts than somebody else, and as professional investors I think it would be lax of us to invest in a company with which we did not feel comfortable, and we are unlikely to feel comfortable unless we have done "due diligence".

984. Does that not mean the Stock Exchange rule ought to be altered?

A. Yes, I would say so; it seems fatuous.

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MR B SIDDONS

[Continued]

*Chairman*

985. Do you feel that in some ways the present rules do inhibit you from getting the kind of information you need to judge a company satisfactorily so as to decide whether their investment in innovation is such as to make the company a good investment?

A. In the first instance, I cannot see that the rules as currently stated can ever realistically be observed.

986. You do believe that the present rules inhibit you from getting the kind of information you need?

A. I do not think they inhibit us. The rule seems to be a complete *non sequitur*; it is out of line with the thinking of professional investors. How can we do our job and perform "due diligence" in terms of the companies in which we invest?

987. I am not trying to put words into your mouth. Do you feel that the present rules make it difficult for you to carry out your duty to find out about companies?

A. If one interpreted the rules slavishly I would say yes.

*Lord Gregson*

988. If you were in America, under the SEC rules you would go to prison?

A. A lot of Americans appear to go to prison, do they not?

*Lord Vinson*

989. We are concerned here about the effects of the inadequacies of British R&D and the extent of it. What thinking have you done in terms of solutions you would like the Committee to put forward?

A. I think there are many issues involved here, one of which as you know is the much-used and abused expression "short-termism". Unfortunately, one is faced with many pressures, including pressures from actuarial consultants and others on short-term performance and also pressures on profitability. Earlier this afternoon mention was made of the yield and what would happen to the equity market if you cut dividends by two-thirds. How would companies fund their future activities? As the Irishman said, if you wanted to get there you would not want to start from here in the first place. I am afraid that is where we are, which is regrettable but is a fact of life we must accept. I think there is a psychological problem to be addressed in terms of the structure of shareholdings. The Germans and Japanese take the long-term view and expect to reap long-term rewards. They are real problems which will take time to resolve, and a lot depends on a change in attitude. Hopefully, one can encourage the perception of investors that their best long-term interests are served by taking a long-term approach and investing in successful companies. I think it is a terribly difficult problem to address given the position from

which we start. I think that perhaps accounting practices can be tightened up in the sense that more weight should be given to R&D. Mention was made of capitalising or amortising R&D over three years. There are a number of arguments about this. R and D are very different things. How do you capitalise these costs so they do not debilitate short-term earnings? It is an educational process. I do not envy you; I think you have a difficult task.

*Chairman*

990. Would you be in favour of the idea of capitalising R&D over three years to iron out the ups and downs?

A. Yes, providing it was not used as an excuse, as so many things are in many accounting practices today, to brush things under the carpet.

*Lord Vinson*

991. There might be a temptation to capitalise the expenditure to hide poor results?

A. Yes. I think there should be more explanation in the accounts of companies and companies should be made more accountable, and perhaps there should be more tax incentives.

*Chairman*

992. To encourage R&D?

A. It may be regrettable, but if one wants a totally flat playing field and if we are to be internationally successful, when we see other countries' economies favouring sectors of their economies and certain companies, it is wrong that another country's economy should suffer because it is not prepared to help in that way. I hope the playing field will be made level. We need to provide an inducement to the corporate sector because they are very conscious about keeping their shareholders happy. Consequently, I fear that some inducements may indeed be the only answer.

993. By what, for instance?

A. We had a capital allowance structure which has now largely finished. I believe one has to give an incentive to industry and investors to help us compete internationally. If that is the only way to do it I feel we have to do it. We cannot be penalised against our competitors.

*Lord Gregson*

994. Do you not find it strange that in all the Common Market rules the one area where government support for industry is allowed is R&D, and we are the one country which does not do it? Is it not a striking example of how blind we are in this situation?

A. Yes.



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[Continued]

*Lord Vinson*

995. Would not the first step of that be to look at the 25% diminishing capital allowance, which is quite narrow in inflationary times? Of course, there is nothing free about accelerated amortisation—which can be a very dangerous term—compared with what we have now, which is retarded amortisation. Would you say that is damaging to companies?

A. On balance, yes.

*Chairman*

996. We have talked a little bit about short-termism and long-termism. Can you define your use of the expression “long-term”? How long is too long before you get a return on your investment? Is it seven years, ten years or what?

A. Too long is when you go beyond a cycle which reverses. Some industries have a very short-term horizon; others like Glaxo have a long-term horizon. Therefore, the short term and long term is very difficult to judge. I would think of the long-term as being five years. We have held shares in Hanson Trust and BTR for 20 years, and I do not think we have ever sold a share, because we believe in it in the long term; we believe in the long-term corporate strategy. There may be technology industries where, say, a printed circuit board company may have a boom period whilst it is providing companies with a product, but that product may become obsolete, and therefore the horizon you look at will be different in one industry from that in another. Essentially, we are not short-term speculators; we are not buying to make a sale tomorrow, next week or next month, or even six months. The “long-term” is certainly more than a year, and it could mean five years.

997. You are referring to big companies. What about small companies or single-product companies which have to invest in a particular product and there will not be a return for seven or 10 years? Would that provide a satisfactory reason for making an investment?

A. If one believed that company had a technology which was going to win, yes. Rank Xerox and Polaroid are examples of companies which were small to begin with, but people believed in their technology and backed them and did very well. Again, it depends on the merits of the individual company.

998. Do you invest in that sort of company?

A. Yes, we do. We have just raised £60m for a development capital fund which we have just formed. We have a very successful and prosperous development capital operation within Kleinwort Benson Investment Management. These are companies which probably have a valorisation time frame of three years. The fund has a life of seven years, so it has to be wound down after that period of time.

*Lord Gregson*

999. Do you include buy-outs in your investment portfolio?

A. Yes.

1000. The Bank of England have said that buy-outs are sterile money because it does not do anything for innovation.

A. It can probably do quite a lot for innovation, and it can do something for management, because existing management may not be bothered to expend money on innovation.

1001. That has not been the recent record, has it?

A. That is probably a general comment rather than a specific one. We would say that hopefully the management buy-out companies in which we invest will be able to prosper because they are free of the shackles which have inhibited their progress.

1002. To follow up the point about long-term investment, most of the institutions tell us that they invest for the long term. I cannot understand why there is such a large volume of dealings on the Stock Exchange if it is the case that everybody sits on their shares for long-term investment purposes?

A. I think the nature of the industry is such that there are a lot of funds which are the subject of short-term views. I think the private investor tends to take a shorter-term view than institutional pension funds, for example. They are quite a powerful force. Some of the active investment trusts would take a more aggressive view. I think our investment trusts have less turnover than the pension funds. You ask: Where does all the turnover come from? Until recently, brokers would have been asking the very same question because they have been starved.

1003. But the turnover has been enormous?

A. But money is coming in all the time. It may be enormous in sterling terms, but it is not enormous in terms of total funds under management. I do not honestly know what the figures are, but I would not agree with “enormous”.

1004. How much of the funds under management are in British equities?

A. Approximately, 50%. A pension fund will have most of its funds invested in real assets in the UK to meet real liabilities. I think that 50% of most institutional monies will be in quoted UK securities. The turnover is obviously coming from a flow of funds, and the annual cash flow is about £23bn-£24bn and the institutions currently have about £30bn-£40bn in cash. There are also funds which are being wound down and the creation of trusts. I agree that to the extent turnover is excessive it cannot help companies.

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MR B SIDDONS

[Continued

[Lord Gregson Contd]

1005. It is brokerage to some extent?

A. I think a lot of that has stopped, because in the old days brokers earned their income through commissions. What has happened is that most of them now use fees. When we acquired a firm of brokers one of the first things we did institutionally was to move from a commission charge to a fee for private client investment management.

*Chairman*

1006. A very small part of the big turnover on the Stock Exchange is related to new money for new products or innovation?

A. New money would take the rights issue route when a company is wishing to raise capital for new investment.

1007. But is that not a small proportion of Stock Exchange activity?

A. I would think it is negligible.

*Lord Vinson*

1008. Can you tell us a little more about your venture capital fund and your approach to this form of investment?

A. I am not an expert, but the fund is set up to invest in emerging companies. They usually have emerged. I have to admit it is unlikely there will be a lot of investment for this particular fund in companies which have not been well-established or profitable. There are development capital funds which will be investing in certain areas or industries which may not be profitable for two or three years. A company will require equity finance and will come to us because, frankly, they cannot afford to pay an excessive interest rate, or do not wish to do so, and they are happy to give up some equity for cheap capital, or risk capital. There is still an appetite on the part of investors for the right venture idea. This fund has done better than 3i and it has a good track

record. We encourage our pension funds, and indeed our investment trusts as well, to take a stake and have an exposure in development capital companies. It is best to do it through a fund where one can spread the risk. We have a relatively high exposure in smaller companies. As far as the FTA share index is concerned, the exposure is about 6%, as defined by a market capitalisation of £180m or less. We are higher than that; about 10% of our investments are in smaller companies. As investors, we do have a long-term exposure to venture capital.

*Lord Gregson*

1009. Is it easy or difficult to attract money for the purposes of venture capital funds?

A. We have no problem at all. Of the £60m, we raised £15m from existing funds. The group supported us by putting up £10m or £11m themselves, and we raised the rest from outside. I think our good reputation helped us.

*Chairman*

1010. How much of that venture capital goes into manufacturing industry?

A. It is being invested over a three-year period, and so far we have made seven investments, only one of which is in the service sector.

1011. Six have been in manufacturing?

A. Yes.

*Lord Gregson*

1012. How many are buy-outs or buy-ins?

A. Two are buy-outs.

1013. Not buy-ins?

A. I am sorry; one is a buy-out and one is a buy-in. Chairman] Thank you very much for answering all our questions.



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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 6 June 1990

**OXFORD INSTRUMENTS GROUP**

*Sir Austin Pearce, Sir Martin Wood and Dr Peter Williams*

**QUANTEL**

*Mr Jeff Meadows and Mr Paul Kellar*

**HARVARD BUSINESS SCHOOL**

*Professor Michael E Porter*

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WEDNESDAY 6 JUNE 1990

Present:

Butterworth, L	Gregson, L
Caldecote, V (Chairman)	Kearton, L
Chorley, L	Taylor of Gryfe, L
Clitheroe, L	Whaddon, L
Erroll of Hale, L	

**Examination of Witnesses**

SIR AUSTIN PEARCE, Chairman, SIR MARTIN WOOD, Deputy Chairman, and DR PETER WILLIAMS, Chief Executive, Oxford Instruments Group, called in and examined.

*Chairman*

1014. Sir Austin, we are very grateful to you and your colleagues for coming along to help with this inquiry. We hope to make some recommendations which will improve the competitiveness of British industry and so help the balance of payments problem. Would you like to make any preliminary remarks before we start on the questions?

(*Sir Austin Pearce*) Chairman, perhaps I might just introduce my colleagues, whose backgrounds are somewhat different. Sir Martin Wood really is the initiator of Oxford Instruments and has seen it grow to what it is today; so he knows the whole history of the Oxford Instruments Group. Dr Peter Williams is the Chief Executive and has been very much involved in the technology and the changes. I came into Oxford Instruments only three years ago when I retired from British Aerospace, so I am very much the new boy who has seen it from the outside.

1015. Thank you very much. Our first question is a general one. What difficulties have Oxford Instruments encountered in growing from a very small firm to a medium-sized company; what do you see as the risks that are involved particularly for small and medium-size companies which are operating at the leading edge of technology?

(*Sir Martin Wood*) You said it is a very broad question; one has to generalise and abbreviate, you understand. I think it is fair to say that a very large majority of all the difficulties we encountered in growing from a small to a medium-sized company involved people; not institutions, not laws, not structures, not even technology. Of the people I would say, I should think, that more than half, let us say two-thirds, of the difficulties we encountered were with people we employed and less than a half, let us say one-third, were with people outside the organisation, with our customers, with our competitors, with our bankers, with our sub-contractors, and so on. If you want to make a small science-based firm 'hum' you have got to have a very special sort of person who is either a scientist or an engineer, or at least has a deep understanding of those subjects, combined with very strong entrepreneurial flair and business skills. Those people are hard enough to find, anyway, within our educational system and national culture, but on top of that you need a great deal of flexibility because, as a science-based company grows very fast, usually, you need different people with different attributes at

different stages and you need flexibility and a rational attitude of people to what they can contribute and what they cannot contribute. When you start small you want a certain sort of person and a very short time later you need a different person with a different form of leadership. I think you could generalise and say that the firms which succeed are those which evolve without major personnel or leadership explosions within them, and those which fail are the ones where the leadership has become inadequate; so it is people. One could go into detail as to where they interact and what they actually make, but it is essentially a person problem. The obverse of that is, of course, that if you get the right people, and you need very few of them—in an organisation you need only one or two people at the top—the whole culture, the way a system operates, permeates through the system and it all begins to work. They are rare people; the important thing is to find one or two and give them what is necessary to feed them and they will run the system.

1016. Would you then agree that you need what you might call a product champion, and I think you were that, and also you need a fairly flat organisation without too many levels of authority?

(*Sir Martin Wood*) As I have said, I do not actually think the structure matters too much. I think if you have got the right people they will work through any system, any structure, almost; if you have got the wrong people whatever structure you have it will not work.

*Lord Taylor of Gryfe*

1017. Is there a problem about people being trained to be the right people? You are basing your entire case on getting the right people. How do you get the right people and are we producing the right people from our educational system?

(*Sir Martin Wood*) I am not a social scientist. Having got some of the right people, having got in place what I think is in many ways the right environment for the sort of company we are to flourish, we actually do not find it hard to find people with the right attributes to come and join us. It is a thing that feeds on itself. When you have got the system right it is easier to build on. If a system is wrong it is very difficult to convert it.

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SIR AUSTIN PEARCE, SIR MARTIN WOOD  
and DR PETER WILLIAMS

[Continued

[Lord Taylor of Gryfe *Contd*]

1018. Do you approach people from other companies or do you get them from the universities? What is the 'flow' of the right people?

(*Dr Williams*) It is a mixture.

(*Sir Austin Pearce*) I may embarrass Peter, but having come in from the outside it seems to me that the attributes which you are requiring are, first of all, that they must understand the technology, that is absolutely fundamental; but a layer on top of that has to be this sort of business nous, if I may use that word, and I think Peter is an example of this. He is qualified up to the nth degree in physics and things like that, he talks language I do not even understand, but he can talk to his own scientists in that way and then when I criticise what he does he can answer back to me on a commercial basis. I think that is what we are looking for and I think it is that second part which is almost built-in, or inherited, but there is a way of teaching it in our universities; I do not think they tend to do it.

*Chairman*

1019. They do not do enough of that element?

(*Sir Austin Pearce*) They do not do anywhere enough of that, putting on top of their wonderful scientific background the commercial interest and discipline, and I think the discipline is very, very important if a small company is going to grow.

*Lord Chorley*

1020. I think Sir Austin sort of answered the question which really was, is it an innate characteristic you are looking for or is it something which one can be trained to acquire: in other words, is it our educational system?

(*Sir Martin Wood*) Some people are endowed with it in greater abundance but everybody has got a bit of this and I am sure this can be trained and it evolves in the right environment. Training in these things does help. When I was being trained I went for some of my marks in my degree in company law, and so on, but a very small amount, but it did actually just make me aware of what was going on; I was not taught very much. It was after I had been in industry for a while that I suddenly saw the importance of it and I think the sort of evening reading, the day's courses and the odd week is something I went on much later on in my life, which actually was more important than the set courses at university when I was 18, or whatever.

*Chairman*

1021. Do you do much of that kind of training yourself in the company?

(*Sir Martin Wood*) Yes, we do.

(*Dr Williams*) It is changing, I think. I would agree with Sir Martin's and Sir Austin's comments that we have not, to date, had a problem recruiting what I would call the 'key' people, who clearly have technological and engineering skills but, above all,

have aptitude and personality, I cannot overstress that. However, there are only just so many people like that around and one has to build organisations and structures around them, and as we have grown to a medium-sized company we are increasingly conscious that there is not an infinite resource of that kind of person; we have to take less well-qualified, perhaps less able people and train them internally, vocationally, in what we want them to do. I would echo what Sir Austin says, that all too often the outputs from the universities are not oriented towards the world of commerce and industry; their orientation is quite different.

*Lord Butterworth*

1022. Do you think there is anything in the assertion that the problem arises at an earlier stage and that for many reasons young people are not attracted into engineering and into industry but go off into the arts, or whatever it may be; that there are more people of ability about but that industry is not getting its fair share of them?

(*Sir Martin Wood*) Yes.

(*Sir Austin Pearce*) I believe there is a series of threads, Lord Butterworth, in what you have said. There is a greater move now and I think there have been one or two things like Industry Year and Industry Matters which have encouraged schools to be more involved with industry and we are starting back in the elementary schools now, and therefore youngsters are beginning to move into the scientific world, if you like. The teaching population I think is changing, as well. Gradually—very slowly, but gradually—I think they are changing, and what we are seeing is that, yes, there are more people interested in, for example, technical subjects and the engineering subjects. However, one of the real worries I have is the number of engineers who qualify as engineers then go straight out of that into an accounting firm or a merchant bank or something like that, and some university departments are actually losing 50 per cent of their engineers into that sort of thing. There is a very simple reason for that and that is the question of remuneration; you can get twice as much.

*Lord Clitheroe*

1023. Do you see this happening very much more in this country than in any other countries?

(*Sir Austin Pearce*) On the basis of my other experiences, yes, very significantly more. Going back to aerospace, to see the status, if I may call it that, of the engineers in Aerospatiale, compared with the people in British Aerospace, it is almost a different order of magnitude.

*Chairman*

1024. Even though our aerospace in this country is probably better than most countries in that respect?



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[Continued

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(*Sir Austin Pearce*) Due, to a certain extent, to some of your efforts.

*Lord Chorley*

1025. Status or quality?

(*Sir Austin Pearce*) I do not think there is anything in quality, I would say our quality is every bit as good; but in the status, remuneration, rewards and things like that, and esteem, it is significantly different.

*Lord Butterworth*

1026. If that is so, that is a criticism of industry, is it not, over a long period of years, that you have not paid people enough to become engineers and so you are reaping the reward of it? If, indeed, engineers had been paid comparable with lawyers or doctors then industry would have acquired its fair share of the most able?

(*Sir Austin Pearce*) Yes, that, with all respect, is the simple answer; but perhaps I may quote an example of a discussion I had with Sir John Nott, who when he was running Lazard's and I was running British Aerospace said exactly what you have said to me, "You are not paying your engineers enough, you ought to pay them significantly more"; I said, "Well, John, how many people do you actually employ to whom you pay these high salaries?" and he said, "About 50 or 60". I said, "I have got 17,000 people; how am I going to justify paying all those people and get the profit back?". There is no answer to it.

1027. How is it then that in the States or in Germany or, as I understand it, in France those societies can be more successful, presumably because they pay commensurate rewards to fewer people and can produce a competitive product?

(*Sir Austin Pearce*) No, I think, in fact, they actually pay in the engineering world higher than we do, but the difference between them and the people who are in, let us say, the financial world is not as big, the gap is significantly smaller.

(*Dr Williams*) I think you should not forget the status angle either. We are three curios here; we are all scientists or engineers. It is not the norm for people to leave the world of academia, the world of science, the world of engineering and run businesses in the UK. I am sure there are elements of status that enter into it. In France, if you are a graduate of an Ecole Polytechnique, for example, you are considered to have an education of great value to the community and you are paid commensurately. It is cultural.

Lord Gregson] From my own experience, the Germans pay approximately two to two-and-a-half times as much per engineer at whatever level, so they live in much better houses and they are much more respected in the community because they are highly paid. We underpay our engineers, there is no question about it. Why do we do it?

*Chairman*

1028. Could we explore the question of supply and demand before you answer Lord Gregson's question. If we are short of good engineers, as you say, Sir Austin, why does not the law of supply and demand operate, as it does in the case of accountants, for instance? There is a shortage of good accountants so they are very highly paid to get enough in the accountancy firms because they have a big demand for them. Is it a problem that the engineering firms, on the whole, are not demanding enough engineers and therefore there is not a big enough demand relative to the supply to put the salary up?

(*Sir Martin Wood*) I think you have something of a chicken and egg situation here. I accept quite a lot of the criticism that you make of industry but you can get yourself into a vicious spiral of perhaps industry having a lower percentage of the really bright members of society joining them, as a result being slightly less efficient than they might be if they had their full whack of top-rate people, and hence not operating so efficiently and not making such profits, not being able to pay the salary levels that bring people on. All three of us here travel a lot in Japan and one of the most obvious things is the percentage of engineers and scientists and mechanical engineers who are MDs and directors of companies there. Once you get into the position that we are in in this country, of having so many companies run by non-scientists and engineers, it is very difficult to lift yourself out of that spiral I mentioned and start rewarding and giving the engineers and so on the status that I think they have with some of our industrial competitors.

*Lord Gregson*

1029. Why do we underpay our engineers?

(*Dr Williams*) Or, why do we overpay the others? From recent experience, have any of you tried recently to cut your audit fee or to negotiate a reduction in the transaction fee to an investment bank? It is extremely difficult.

1030. Two wrongs do not make a right?

(*Dr Williams*) I agree.

1031. Why do we underpay our engineers; why do we, if it is such a critical factor that we are so short of good engineers?

(*Sir Martin Wood*) I think that we are slowly putting this right, but it is a long cycle.

*Lord Butterworth*

1032. Shall we do it in time?

(*Sir Austin Pearce*) That is a very difficult question to answer; very difficult indeed. I think that there is another factor, too, in this equation and that is that if you look at the total cost balance of the

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total company the amount of money which we actually spend—this is back to Peter's audit fees, in a way—on those things which are not engineering, not technological, the proportion of our actual income which we spend on those things in our companies, *in toto*, is much greater than it would be in, say, Germany or France.

Lord Whaddon

1033. Since the law of supply and demand does not appear to be correcting the situation quickly enough, is there anything at all that Government could possibly do, that you know of?

(*Sir Austin Pearce*) My answer to that is no, I do not think there is. The sort of thing you would have to do is to start controlling the salaries and the costs of this financial overlay and I am not sure that that is a practical proposition.

Lord Clitheroe

1034. What is your experience of City attitudes towards your investments in innovation?

(*Sir Martin Wood*) Can I say, again in general—this applies to all the questions and answers, I think—that one of the most surprising things in this country is that we have some of the best examples of industry and some of the worst almost side by side; that applies both to industry, where you can have some fantastic examples of world-beating in the co-operation of the company, alongside a company which has hardly dragged itself into this century. I would say the same thing in answer to this question. We have had some fantastic support from the City for some of the things we have done and we have also found some people who we do not make contact with, who do not really see what we are doing.

Chairman

1035. Do you do a lot to try to persuade or encourage investors to think you are good and therefore support you; do you take a lot of trouble with your relationships?

(*Sir Martin Wood*) Yes, we do; actually, in a lot of different ways, from our Chairman writing letters to them, to having sessions in London to demonstrate the things we are making and having scientific talks to the institutional investors, and so on. We take quite a lot of trouble about this. Probably we could do more but we do quite a lot. We do not think we get very far, either, actually.

Lord Clitheroe

1036. Do you think that that relates to the fact that the people you are talking to do not understand your language? Does it, indeed, come back to the cultural thing of inadequate numbers of people?

(*Sir Martin Wood*) I think we are in a Catch 22 situation. If you will allow me to be slightly cynical for a moment, something like two years ago when we announced we were doing much the most exciting

thing technologically, potentially profitable, our share price dropped 40 pence, because we were pinning hopes on something in a language which they did not understand. If they did understand it it was probably worse, because they realised what a risky business we were in.

Lord Erroll of Hale

1037. In those circumstances, do you have a finance director? Would it not be his job to sell all this to the institutions, rather than the engineers', who are not notably good at influencing financiers?

(*Sir Austin Pearce*) This is precisely what we do and tomorrow I shall be announcing our annual results. Peter will be there and the Finance Director. Then, in just over a week's time, the Finance Director and I will be visiting all the major institutions which invest in us to tell them what we are doing and all the rest of it. If you look at the people who actually affect your organisation, let me just take three groups. First there are the analysts, who will write up something about our company, to whom we talk and they will say either buy, sell or hold, as the case might be. It is interesting, with a small company of the size of Oxford Instruments, compared with the other ones I have been involved in, that quite a lot of analysts will come along to our meeting tomorrow but a lot more will not turn up at all. They will do write-ups about Oxford Instruments, although they have never been near the place and never talked to anybody of the management, and yet they are the people who determine it. The second group of people are the major investing organisations, the pension funds and people like that, and we will be talking to them in a week's or 10 days' time. We do find, first of all, that the people we talk to keep changing, which is a problem, and some of them do understand our business but an awful lot do not; they do not understand what we are talking about and they will have a very, very narrow viewpoint. The third group, of course, is the media—and the media, well, they have already thought that headline. They do not want to know the technology and various things like that, they do not understand it, and they are the people who affect the smaller investor.

Lord Chorley

1038. How would you contrast this sort of City attitude with the equivalent in Japan, Germany or America?

(*Sir Austin Pearce*) The situation in Germany is, of course, that the big shareholders are the banks and, if you like, the states. If we take Deutsche Airbus, again it is the example I know about, the biggest shareholders were the state of Bavaria; so Dr Strauss, when he was the head of Airbus Industrie, was there to make sure the Airbus Industrie actually worked. We do not have that. The banks do not really take an interest in the investment itself. What



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you effectively have there is the big financial institutions being heavily involved in your company; we do not have that in this country in the same way.

*Chairman*

1039. Some years ago you became a plc; ten years ago, was it?

(*Sir Martin Wood*) It was seven.

1040. Has that made a difference to the way you manage the company, your outlook on long-term investment and the like?

(*Sir Austin Pearce*) I would say the answer is yes.

1041. Could you tell us a bit how?

(*Sir Austin Pearce*) I think that Peter is on the receiving end of this and I will ask him to comment on it but, since I have been in, the quite clear thing is that every six months I have to stand up and justify the performance of the company on just a six-month basis. Whether I like it or not, that is the thing I have to do to the outside world—the investor, the City, the media and all the rest of it—but when Peter comes along with a proposal like the Synchrotron, that is not a six-month programme, that is a four- or five-year programme, and so we are torn. Do we decide to go ahead with the Synchrotron on this basis, because it will not satisfy, will not make the people in the City happy because it will not show profit on six months, it will just show expenditure for five years with nothing coming in?

1042. Is it fair to say that if you do not do it you will be in 'queer street' in five years' time?

(*Sir Austin Pearce*) We will be in trouble. May I pass over to Peter, because he has been on the receiving end of this.

*Lord Chorley*

1043. Can you pick up Japan, too, at the same time?

(*Dr Williams*) Certainly, yes. I came back from Japan last Monday and I would say it is more akin to the situation in Germany, in my limited experience of the relationship between the financial institutions and the companies there, in that there is a heavy corporate involvement between banks, companies and trading houses, so it is not quite as necessary for the stock analysts to understand the details of the technology and the science. I do not think, frankly, they are any better than the best stock analysts that we converse with in the City here; there is no great evidence that they are able to help their companies invest in high technology because their financial institutions spend an awful lot more time on it. It is the fact that there is multi-level contact, from the chairmen of the banks and the companies all the way through the organisations, which makes it easier; there is not the sort of confrontational feel

that one feels from time to time here between industry and the City. Picking up this long-term-short-term point, obviously it is a vexed question. In fact, I have to talk about it at a DTI conference that Nicholas Ridley is opening in a couple of weeks' time and I have not written my paper yet; I was waiting until after this session. We started the IBM contract to build the Synchrotron in 1984, we will deliver it later this year, it will contribute revenues in the early 1990s. When we announced the contract—this was the event that Sir Martin was referring to earlier—we announced a major contract from IBM, we were euphoric and "over the moon" and the stock price went down 40 pence because we had to say, bearing in mind Sir Austin's six-month comment, "Gentlemen, this will only contribute to earnings from about 1992 onwards". The stock analyst who I know best observed afterwards, "Peter, I have time to come in and out of your stock six or seven times between now and then; I do not have to back you long-term, I can wait until 1992". This puts on a lot of pressure. We, I believe, have done the right thing, we have taken the long-term decision, but you sure as hell have to take the lumps as you go through year after year putting these long-term measures in place. It does not make life easier.

*Lord Taylor of Gryfe*

1044. I sometimes think that the City is somewhat maligned about taking the short-term view. The record of your company would suggest that you were able to go to the City; the share price may have fluctuated here and there but you were able to get the necessary financial backing for innovation, in your case. Would that be true or not?

(*Sir Martin Wood*) We have very good relations with most of our customers and one of the things that has helped us through difficult periods of our history has, in fact, been a very close relationship with our customers. There has been a time when the City has looked on us with a lot of favour, in fact perhaps too much favour, being a sort of "glamour stock" for the first few years. That is really because—I think I am right, correct me if I am wrong here, Peter—I think that a major part of the media understood for a while what we were making and that we were involved in one product, and it really was not our major product but it was one they understood involving medical imaging. They were able to understand this and they saw that there was a big future for this and there came the time when everybody had a relation who had been through one of these, so that one could relate to it, and we got praise and a high rating for this. Criticism was that we were a one-product company and the more successful we have been in saying, "We do lots of other things, too", so people have realised we are just an ordinary technology stock and that there are a lot of risks in it. One of the ways in which a profitable company like ours expands is by mergers and acquisitions and using its paper, and that is denied

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[Continued

[Lord Taylor of Gryfe *Contd*]

us at the moment because we feel our stock is undervalued. I think the effect of the City on us at the moment is actually impeding our progress.

*Chairman*

1045. Is it not true, Sir Martin, that in the early days you had some quite good patient money from 3i?

(*Sir Martin Wood*) We did, and I believe you have said that we were one of your best investments, too.

1046. We had nothing out of you for about 20 years and then made a bomb!

(*Sir Martin Wood*) You were willing to wait.

(*Sir Austin Pearce*) Chairman, might I ask Peter to comment; I think he has got an important point to make.

(*Dr Williams*) It is a very quick one; I think examples are often very helpful. Martin's point about the customer helping and the previous comment about perhaps the City being somewhat maligned: this Synchrotron development is not being funded by the City, it is being funded by IBM with a little bit of help on the top-up side from the Department of Trade and Industry as well, to the tune of, if I can be approximate, shall we say, £10 million. We have overrun on that because we cut the project to the bone to get in there, against German, Swedish and American competition. We have overrun by 20 per cent on that project and Sir Austin and I regularly, every six months, have to run the gauntlet with the analysts to be told that we are overspending and that our R&D programmes are out of control; and this is for a programme that is 80 per cent funded by an American company. It is not funded by the City, it is funded by the customer, and I think this is a very important point that Sir Martin has made.

(*Sir Austin Pearce*) It demonstrates, Chairman, I think, the very, very great importance of a smaller company having an extremely good relationship with the customer, because that is often forgotten. The customer is really paramount.

*Lord Taylor of Gryfe*

1047. Dr Williams has just made reference to the DTI's involvement in your affairs. Could you say a little about how the DTI are involved? Have the DTI been a helpful partner? What is the relationship between you, and was it necessary?

(*Dr Williams*) The grant I made reference to was a £1 million support under the now defunct Support for Innovation scheme. It was welcome. It was not what the DTI refer to as the concept of additionality, where they ask, "Will this money tip the company over the edge and help them win; will they take the decision to go forward if we give them it or will they withdraw if we do not?". Frankly, we were committed and we were honest and up-front with the DTI about this at the time; so their involvement and help was not as a partner, it was not that which got

us up out of the trenches and over the top at all; it was the involvement with IBM that did that. Having said that, the support was very welcome, it enabled us, as a catalyst, to go forward to IBM and say, "Look, we are getting support from our own Department for Trade and Industry, they do view this as a positive development, we cannot get any more; you people are the customer, you are going to have to pay for it". So it was welcome but not pivotal, it was not central.

1048. What form did it take; was it a loan or a direct grant?

(*Dr Williams*) It took the form of direct R&D support, a direct grant.

*Chairman*

1049. Were these grants repayable?

(*Dr Williams*) Under certain obscure circumstances; by and large none repayable, but a tiny proportion of our total expenditure. Really, I think, if you took R&D *in toto* and looked at the direct support into industry by DTI, certainly the figures I see, sitting on DTI committees, frankly it really is minuscule.

1050. By and large, you think that was a good scheme, you would like to have seen it continue?

(*Dr Williams*) I think insistence on two companies in all modern schemes is a great inhibition, and I think most people within industry and many, many people within the DTI would also agree with that. The Support for Innovation scheme allowed a single company to go to the DTI and obtain support. The new support schemes which have been brought in do not allow that, they are inherently "club" schemes; you have to confront all the complications of IPR between companies, we all know about pre-competitive research. It is difficult; it does not get you off the ground and running as quickly as the sort of subvention that it is our view, maybe incorrectly, that some of our German and Japanese competitors have access to.

1051. What you were talking about was not pre-competitive research, it was development?

(*Dr Williams*) It was direct support for R&D, and was very welcome.

*Lord Gregson*

1052. I was the bloke who started the Product and Process Development Programme in the DTI when I was Eric Varley's adviser. That was a scheme, of course, which industry suddenly found was a great advantage and used so heavily that the Treasury slapped a moratorium on it then cut it down to one-sixth of its funding. It is really quite ridiculous, is it not?

(*Dr Williams*) It is.



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[Continued

*Chairman*

1053. Could Sir Martin tell us how the SFI scheme helped the company in the early days: to what extent; how important was it?

(*Sir Martin Wood*) I do not think we made any use of it in the early days.

(*Dr Williams*) Off and on, Martin.

*Lord Gregson*

1054. You had applications on the Product and Process Development Scheme?

(*Dr Williams*) We did.

*Chairman*

1055. Looking back on it, do you think you could have made more use of it; would it have been valuable to you at that time?

(*Sir Martin Wood*) Probably.

1056. You got by without it, obviously?

(*Sir Martin Wood*) We got by without it.

*Lord Clitheroe*

1057. Could I ask a question, going back to the short-term issue. Have you any solutions to this problem or is this another Catch 22 situation?

(*Sir Austin Pearce*) I do not think we have a solution to the problem; I think it is, as you say, a Catch 22 problem. If you look at the requirements being placed upon the people who are actually investing in us, or anywhere else for that matter, they are under pressures also; they have to report every three months.

*Chairman*

1058. Do high interest rates make a big difference to your investment decisions?

(*Sir Austin Pearce*) Can I answer that question in two parts, Chairman. With regard to the actual investment itself in innovation I think the answer is no, but they do have a very significant impact upon the cash flow, particularly of a new organisation just starting up. So many organisations, I regret to say, do not have the discipline of looking at their cash flow activities and unless they do, particularly at a time of a high interest rate, before they know where they are they are out of money. If you take Oxford Instruments and what I have seen of it, no, it does not have any significant impact because we are talking of things long term and we do not know what interest rates are going to be even next week let alone in five years' time; but if they are high and you are a start-up company that cash flow is absolutely vital.

1059. If you are financed to a large extent by loans? If you are financed largely by equity it does not matter, if it is patient?

(*Dr Williams*) Going back to this customer point, in the early days, although I was not present at

Oxford then, I was in a similar company (VG Instruments). The company depended very extensively for its cash flows on up-front payments from its customers; without that, I think it would have been very difficult in an interest rate climate like the present one.

*Lord Kearton*

1060. Do you write off your R&D each year?

(*Dr Williams*) Yes.

1061. Over the years, have you accumulated a large part of R&D which has not, in fact, resulted in any profitable products?

(*Dr Williams*) We have losers as well as winners, yes, Lord Kearton, that is a fair point. I think it is testimony that Sir Martin has made this company survive and prosper for 30 years that we have, by statistical definition, more winners than losers, but we have had R&D that has gone astray, been delinquent, we still do; we will never eliminate that, that is part of risk-taking.

1062. Do you think it is getting harder to find winners?

(*Dr Williams*) It is certainly more competitive to find winners, yes.

1063. The competition coming from Japan and Germany?

(*Dr Williams*) Yes, and America.

*Chairman*

1064. Do you think that the application of SSAP13 is going to help your relationships with the analysts?

(*Dr Williams*) I think it is an excellent start. I think the disclosure of R&D, such as has been prevalent in American companies for donkeys years, is absolutely essential, but it is only one part of the communication. The rest of it is a matter of what you do with the money and, Lord Kearton's point, how usefully you deploy it and what are the results of spending that cash; but it is a damn good start.

*Lord Gregson*

1065. Does it not depend on whether the City understands it?

(*Dr Williams*) Yes.

1066. The American financial houses understand it now because they asked for it. I am extremely doubtful that either the financial media or the City will know what the hell they are talking about. Do you think they will understand what you are saying when you talk about your R&D expenditure?

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[Continued

[Lord Gregson Contd]

(*Dr Williams*) We try very hard. I think there are four or five of the analysts in the better houses who do now understand it. We have also held technology seminars in the City, attended by up to 60 or 70 people, where we have tried to put the point across. Going back to some of the earlier educational points, I had lunch at a financial institution today with three gentlemen whose last lessons in maths or science were at age 15, several decades ago. In that situation it is genuinely difficult to communicate.

(*Sir Martin Wood*) Although we talk about the problem of scientists and engineers going straight into accountancy and law, it does at least mean that there are a few people around in the City who understand very well what we are doing, and when we are talking to analysts we suddenly find someone who has done a D.Phil. in biochemistry at Oxford, or something, and he knows as much about the subject as we do. That is great. It means that not only can he understand us but also he can talk and is probably trusted by his colleagues more than they trust what we say.

Lord Erroll of Hale

1067. There must be a great deal of innovation work which costs money which is not R&D. Do you make any attempt to distinguish between expenditure on R&D, as defined by SSAP, and other expenditure on innovation? If so, how does that compare with your other expenses?

(*Dr Williams*) The answer to your point is that that which will be declared tomorrow in our statement is the strict SSAP13 definition of R&D expenditure. Innovation, to me, runs right across the board throughout the whole company. One of our manufacturing operations at the moment is engaged in a very expensive exercise, assisted by Coopers & Lybrand, on looking at manufacturing processes. This is an equally important part of innovation; that is just expense-out, that will just go in overheads, it will not be separately flagged up as part of the innovation budget.

1068. It just gets lost in your general overheads?

(*Dr Williams*) It just gets lost, yes.

Lord Gregson

1069. You are allowed to declare that as R&D under SSAP13, because it would be the Frascati definition and manufacturing development is allowable. It is paragraph 6, or something like that.

(*Dr Williams*) Yes, we have not done so in this set of figures.

1070. Why do you not?

(*Dr Williams*) I receive that as a very useful input. I will ask my Finance Director that question.

(*Sir Austin Pearce*) Chairman, I think there is another aspect of this which has not been touched on which, as a Chairman, I think is extremely

important. It is going to make boards of directors, because they have to report this in their annual reports, start thinking about what they spend on R&D and what they are getting for it, which is really what it is all about; are you really getting value for that R & D pound, and there are an awful lot of boards of directors, I regret to say, in the past, who have never even bothered because it is just too complicated.

Chairman

1071. I think you have got a joint venture with Siemens; is that right?

(*Sir Austin Pearce*) Yes.

1072. What are the benefits you see from joint ventures, specifically?

(*Sir Austin Pearce*) One of the problems of an organisation such as Oxford Instruments and any innovatory company which develops something is that no product has an indefinite life, there is a period of time when it goes over the top and goes down and you have got to develop the next phase. In addition to that, there is a situation that if you have got something which has a fairly large market, before you know where you are you have got the big boys coming in and they will want to start making these things. Particularly if you are in making an integral part rather than the full and final product which gets to the final customer, you are dependent upon supplying to the big boys, too. In this case you can see the situation where, with General Electric coming in and Siemens, people like that, in order to maintain our position in the market we were going to have to spend a lot more money and we did not have the resources; Oxford was not big enough. Therefore, to be able to compete with GEC we had to have a big partner, a really big partner, which is why we went into Siemens. There were alternatives; we could have said, "Right, we will carry on and employment will go down and we will lose money and hope we will survive"; or we could have said, "Right, scrub it and start all over again". We had an expertise there, we had people there who were extremely important, and this was the way of making sure we stayed in that business. Peter, would you like to add to that?

(*Dr Williams*) Only to say that it is going exceptionally well and Siemens are extending that facility, nearly doubling it in size, increasing investment. They have the money, the market and the muscle and we have the technology and it is a natural marriage of the two.

1073. Are you in control?

(*Dr Williams*) We are in a minority from an equity position; but the management is unchanged, except for one person in the Finance Department, since prior to the formation of the joint venture.



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SIR AUSTIN PEARCE, SIR MARTIN WOOD  
and DR PETER WILLIAMS

[Continued

*Lord Kearton*

1074. Do you not run the risk that the big company will say, "We have got such a lot at stake here, we must take more direct control"? That must be a risk?

(*Dr Williams*) Yes, it is.

(*Sir Austin Pearce*) Yes.

1075. Obviously, as Chairman, you spend quite a lot of time worrying about investment analysts. When we had a witness from one of the merchant banks here we said, "Are there hundreds of investment analysts in the City, or thousands?"; he thought a moment and said, "Thousands". Do you think that all these people really perform a useful function?

(*Sir Austin Pearce*) Like all things, some of them very definitely yes, because there are some of them who really do take their job, in my view, very seriously; they come along and they talk to you, they begin to understand your business and you begin to understand what they are interested in and so forth, and they do come out with some very, very good reports, from which we learn things, too. I think that some of them, yes, but there are an awful lot of them for whom I am afraid the answer is no.

1076. As far as I know, Japan is not littered with investment analysts, is it?

(*Sir Austin Pearce*) No; neither is Germany.

1077. What is very interesting is that if one reads the financial columns of the FT now, investment analysts have almost become a cult group. One hears about the movement of these investment analysts to this firm, that firm, and so forth, far more than one does of the people who are actually producing the wealth. With great respect to Dr Williams, I do not think I have ever read his name in the paper, but some of these investment analysts who report on your company have almost become household words. That seems to me to be a very odd culture?

(*Sir Austin Pearce*) It is.

Lord Taylor of Gryfe]In defence of the analysts, merchant bankers handling large sums of other people's money, pension fund money, and so on, have got to have a fair number of investment

analysts to satisfy their clients that their money is being well managed. Business is such that these investment analysts are no longer generalists or economists in general, they are all specialised in this or that field, and it adds up to a fair number. I have found the analysts frequently look at companies with great expertise and insight. I do not think that there are sufficient numbers of analysts who are engineers, I will say that, but certainly if you take the whole raft of British industry there is very considerable analytical capacity in some of the analysts who look after other people's money. I am sorry, I have made my point.

*Chairman*

1078. Would you agree with what Lord Taylor said, Sir Austin?

(*Sir Austin Pearce*) Yes, Chairman. It is in a way saying what I said. There are certain people who are extremely good and, there is no question about it, I think they do a very valuable service; but there are quite a lot of them who just hop around and you find that they are in the car industry today, food shops the next day, and things like that, or, to repeat what I said earlier, they do not spend the time actually going and seeing what the company is doing. Those who do I think are very good.

*Lord Gregson*

1079. Sir Austin, joint stock banks can pour tens of billions of pounds away on bad loans without a comment from the analysts. Since there has been really no comment from the financial media and yet they criticise you for overspending 20 per cent on your projects, do you not find that strange?

(*Sir Martin Wood*) More than strange!

(*Sir Austin Pearce*) I find it extremely irritating, having been one of those people who have tried to get money and have been told, "No, sovereign debt is much better than you are"!

*Chairman*

1080. We ought to wind up as we have other witnesses to follow. Sir Austin, and your colleagues, we are very grateful to you. It has been a very valuable session indeed.

(*Sir Austin Pearce*) Many thanks.

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[Continued

**Memorandum by Quantel**

Thank you for your letter of 13 March. I give below a first response to your questions. If you would like to pursue the matter further I will be very happy to meet you.

1. Quantel is a high-tech company and our attitudes and structures are dedicated to innovation.
2. We maintain a close world match on external technology and we have recently been involved in a joint venture with a Japanese company.
3. In Quantel, product development and product engineering work hand-in-hand to achieve the optimum product.
4. We have found the DTI to be of considerable assistance and have over the years obtained financial support from the DTI for new products.
5. We have no experience of seeking city investment in our products.
6. We have limited experience of licensing our know-how and purchasing licenses. We have not found any serious problems in doing this.
7. While we maintain contact with some HEIs we have no real experience of technology transfer to manufacturing industry.
8. It does seem to us that SFI in other European countries is maintained at a higher level than in the UK, and it may be that this is a subject worth discussing further.
9. No comment.
10. Quantel is a UK-based company and while we have overseas offices we do not invest in innovation overseas.
11. Quantel carries out some limited defence work for Government but are unable to comment further as we have not seen a copy of the ACOST report.

J P Meadows  
Managing Director  
26 March 1990

**Examination of Witnesses**

MR JEFF MEADOWS, Managing Director, and MR PAUL KELLAR, Research Director, Quantel, called in and examined.

*Chairman*

1081. Mr Meadows, Mr Kellar, welcome. Thank you very much for coming along to see us and thank you for the note you sent to us, we are most grateful to you. Is there anything you would like to say by way of a preliminary introduction before we go on to questions?

(Mr Meadows) I think perhaps I should introduce both myself and my colleague. I have been with Quantel now for just about 17 months. I spent the last five years with Sony, working in Basingstoke, and prior to that my experience has been largely as a customer for the kind of products that Quantel make, so I spent 15 years with the BBC and another seven at NBC, one of the American broadcasters. Paul Kellar is our Director of Research and has been with Quantel since its beginning. He drives forward the products that we make and his name is on many of the most important patents that we hold, so I will defer to him in matters of technology, although I am by training an engineer.

1082. Thank you very much. Could we start with a broad question: what sort of difficulties have you encountered in your growth from a very small beginning to a medium-sized company and now part of a big group? What were the sort of risks that you encountered, particularly in the early days, particularly in a company like yours at the leading edge of technology?

(Mr Meadows) I think, broadly, the things that have been important to us during the course of our growth have been to try to maintain a balance between what we are doing on the technical side and what we are doing in production and in sales. I think Quantel has been successful because the innovation on the product front has been matched by the right level of investment in manufacturing technology, in computer-aided design and development and, similarly, by a certain amount of innovation on the sales front. Ours is a company that depends very much on taking an unusual look at an application and coming up with a solution which perhaps has not been imagined by the users and certainly not by



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MR JEFF MEADOWS  
and MR PAUL KELLAR

[Continued

[Chairman Contd]

the competitors. I do not know whether you have anything to add, Paul, about difficulties encountered in the early days?

(Mr Kellar) No. I very much agree with what the previous gentlemen were saying about the people. A limit to what we have been able to do all the time has been people and the risks that that has led to, in a way; we have been very vulnerable.

1083. People doing the research and development work, principally?

(Mr Kellar) Yes.

1084. As to whether they can do it successfully?

(Mr Kellar) And in time, particularly. In our particular industry we have been driven by major public deadlines, such as the Olympic Games, for example, and that is good for project management but it turns up the risks.

(Mr Meadows) Yes, many times our projects are simply not allowed to be late.

1085. That is absolutely fundamental; you cannot be just a bit late?

(Mr Kellar) That is absolutely right. The Olympic Games is two weeks long. Something that is two weeks and a day late is no good.

1086. You have achieved that time-scale; which is what many companies have failed to do and missed the market or got much more expensive because they have gone on too long?

(Mr Meadows) I think we have an extraordinary track record in meeting those kinds of operational deadlines.

1087. Could you give us some tips as to how you achieved that?

(Mr Meadows) In the end, it has always depended on the people and it has depended on a group of people particularly in development but also elsewhere in the company who are willing literally to move heaven and earth, to work weekends, to work nights, to do whatever is necessary to get the project done.

Lord Kearton

1088. What is the motivation?

(Mr Kellar) It is not money, funnily enough. It is purely that we want to make it work; partly that we know all the individual customers very well—we certainly did in the time-frame that we are talking about here, perhaps five years ago—and we were not going to let them down. I think it is a classic engineering determination, basically, that this thing is going to be built and is going to work and it will be done on time.

(Mr Meadows) I think we also have the curious benefit that our employees can see the results of their

labours on the television every night, so that they get a peculiar kick out of knowing that “that is a product that I built, or that I kitted, or that I bought the parts for”, or whatever.

Lord Erroll of Hale

1089. I was very interested in a phrase you used in your remarks, Mr Meadows, about innovation on the sales front. I do not think we have heard that phrase used before and I was wondering if you would tell us a little more what you mean by that?

(Mr Meadows) I think the history of Quantel is riddled with projects which at first sight were not appealing to their consumers. We have made almost a fetish out of producing things for which there was no apparent demand. It is quite hard to think of examples of this in other industries but perhaps the most obvious example for Quantel is the thing called the “paint box” which is our most celebrated product. In a sense what we were offering broadcasters and graphic artists was the opportunity to replace \$100-worth of pencils with \$100,000-worth of electronics. As you can imagine, at first encounter they thought that was a rather ridiculous idea, so we had to spend quite a lot of time at the front end of our business, engaging the hearts and minds of the people who would use this product almost in defiance of their masters. Those who were charged with the responsibility for investment in the various TV stations were not really interested in this kit because it represented a capital expenditure for which they had no budget, so we had to go in with the artists and seduce them, really, with the power of what the technology was able to offer them. That is really what I meant when I talked about sales or marketing innovation.

Chairman

1090. So you were making a market for a product rather than the usual thing, which one is told is the right thing to do, making a market specification to which you develop a product?

(Mr Meadows) Yes. I am afraid our company in that respect may be very different from many others that you talk to. We vigorously reject the idea that we can do business, that way, by a process of market surveys, identifying opportunities and building products to meet them. We are, I believe, and proud of it, a technology-led company, and I will modify that in a minute, rather than a market-led company. The modification that I would make is that we do our best to make the technology invisible to the guy who we are expecting to use the equipment; so when I say technology-led we are really led by the idea behind the application, by what we can bring to the application and how we can change the way that people do business. If all that we can do is build what the customer is asking for we tend to walk away and leave that to someone else because there are too many people who can do that; so unless we can imagine a different way for the customer to do his

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MR JEFF MEADOWS  
and MR PAUL KELLAR

[Continued

[Chairman Contd]

business and imagine a way that we can bring technology to add value to that we do not bother. I think that sums it up.

(Mr Kellar) That has not changed; skipping forward in history, we are still working that way, even as a larger company.

1091. You have to understand deeply your customers' needs but you do not wait for him to specify; you say, "We have got a good product, or good idea, that we think we can develop to meet your needs better than you meet them now"?

(Mr Meadows) Yes, we are almost always saying, "Have you thought of doing it this way?" and quite often the reaction from the customer is, "That is stupid" or "That is silly" or "That would not work because of union demarcation in my plant". There are many obstacles placed in the way of the products that we launch when they land in the market and that is where we have to match the creativity of what Paul does with the creativity on the sales front.

Lord Kearton

1092. It is fair to say you have had a growing market to go for, is it not?

(Mr Meadows) I think we would claim to have grown it.

(Mr Kellar) If you mean that the broadcast market is growing, yes, that is true, but we do not cover the whole of it. That there is more demand for pictures is certainly true, that we accept.

(Mr Meadows) When we launched the paint box there was no market for electronic graphics; that was something created by that product, if you will.

Lord Taylor of Gryfe

1093. Immense changes are taking place in this field, apart from the new channels that will emerge—satellite, cable—and so on. You are in a rapidly expanding industry and you have a great big stake in that industry, doing 35 per cent of your turnover in sound and vision. You are a relatively small company, £163 million. How do you respond to that changing scene—it is a complete revolution—of new products, new ideas and very, very heavy investment in equipment?

(Mr Meadows) Bear in mind that the figures which you quoted I think refer to the UEI Group, of which we were a part prior to Carlton's acquisition of UEI. Our part within that Group is relatively specific. We have always been a manufacturer of high-end, image-handling equipment, both for the broadcast industry and the printing industry, and also, to a less important degree, for the medical and scientific industries. Although the overall broadcast market is growing very rapidly, we have a fairly focused view of our role within it, which is to try to provide innovative and useful ways of handling images. I want to be careful that I am not answering for the whole Group. In our case I think we have to continually look for opportunities to apply the

technology that we understand to allow users within that industry to do something which was previously not possible.

1094. Are your major competitors the Japanese in this field; they are in cameras and other aspects of television production?

(Mr Meadows) I think not, actually. I think we have to be watchful of the Japanese in terms of future competition but the Japanese have tended to succeed in our industry in producing products which have an existing definition. The job of a camera is very straightforward; what happens inside it may be complex but its job is to photograph a scene and make an electronic reproduction of it. The job of a video-tape recorder is similarly quite simple, it is to play back what it recorded faithfully. When we start on the development of a product we almost always cannot describe what it is going to do, we will not know that until the end; I think that is fair, is it not, Paul?

(Mr Kellar) Yes, and it certainly will not be finished when we either first show it to customers or first sell it to customers; it will continue to change for many years, simply because the customers' use of the machine and our understanding will evolve together; that is a success.

Lord Taylor of Gryfe

1095. You have a remarkable record of creativity. I am interested in how you keep up the momentum, year after year; how do you get the people and all the rest of it?

(Mr Kellar) We are going to ask you that! It is a worry.

(Mr Meadows) There we are back to people and I think it is interesting that the names which appear on the majority of our most important patents are people who still work for us. We have managed to assemble under Paul's leadership a rather unique team and to keep it together and, at least within the limited boundaries of our company, the engineer is a very important character indeed and he is not the worst paid person in the company. We have elevated the development engineer, at least, to a fairly high status within our company.

1096. Do you take on many new graduates?

(Mr Kellar) That is an embarrassing question, actually. We have formally stopped recruiting graduates directly from university.

1097. I gathered that from Mr Meadow's letter.

(Mr Kellar) It is because none of the ones we have recruited are still with us.

1098. Where do you go for your people?



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MR JEFF MEADOWS  
and MR PAUL KELLAR

[Continued

[Lord Taylor of Gryfe *Contd*]

(*Mr Kellar*) We try to find people after two or three years' experience, when they are bored out of their skulls at Marconi or Plessey, or somewhere, but basically by personal contact.

1099. You have obviously got a lot of contacts directly in the industry?

(*Mr Meadows*) Also occasionally from customers.

(*Mr Kellar*) Jeff was a major customer of ours and we have been after him for many years.

Lord Clitheroe

1100. As we said, you are a very successful company and you have managed to do this in the UK environment. We have heard a lot about difficulties in this environment, but it somehow seems to suit your company. Can you talk about that?

(*Mr Meadows*) Yes. We have done it, I believe, by, as far as it is practical, taking care of all the aspects of our business ourselves, so we have not relied very heavily on outside contractors, we have done our best to match, in terms of production engineering, the same level of innovation that we have in development engineering. There are almost some elements of the fortress state. We have become self-sufficient and able to manage our business internally. In the earlier stages of the business we did get some support from DTI on a couple of projects, which was I think enormously helpful, and in those days I think the DTI were quite flexible about the direction which the project was taking. What I mean by that is our projects almost always kind of wander towards their eventual shape and, to the extent that the DTI were supporting us with a grant, in those days, anyway, it was kind of them to be open-minded about what it was we were actually building.

Chairman

1101. This was the SFI scheme?

(*Mr Meadows*) Yes.

1102. And you found that very helpful?

(*Mr Meadows*) That was a good scheme, yes.

1103. And you are sorry, not only from your own point of view but also from the national point of view, that it has disappeared?

(*Mr Meadows*) I think so. As we have grown we have accumulated sufficient resources of our own to manage most of the projects that we want to get on with, but that was an enormously helpful scheme for us and I think might be helpful today for companies trying to make a start.

Lord Chorley

1104. What were the characteristics which made it so helpful? What is the particular thing about it?

(*Mr Meadows*) I think, for us, one of the characteristics, in contrast to some of today's programmes, was that we were not obliged to collaborate with anybody else in order to get the money.

(*Mr Kellar*) The fact is, we cannot do that; it is not just ill-will on our part, it has never worked whenever we have tried it.

Lord Taylor of Gryfe

1105. How does the present scheme work?

(*Mr Meadows*) It seems difficult to get any kind of grant unless you are involved in some kind of collaborative project. The one example that springs to mind, and we are getting money from the DTI in respect of it, is the EUREKA project, but we are, I guess, inhibited from going much further with that because the overall arrangements of the EUREKA project seem to require that we do something with Philips or something with someone else in Europe.

Chairman

1106. In principle, it is basic, co-operative research, is it not? Is that right?

(*Mr Meadows*) Yes.

1107. It is not near-market research, because they do not like that, it is basic, co-operative research?

(*Mr Meadows*) Yes, and I suppose, as such, not particularly useful for us. It may be useful for other companies but I think the work that Paul and his guys do tends to be rather close to the product.

(*Mr Kellar*) We actually do very little of what I think you would call research, as such; it is much more, I think, what you would call development.

Lord Clitheroe

1108. If we could go back to the question of the environment in which you can flourish, you flourished very well in the UK because your success proves that. Can you envisage having built up this business in another environment which would have bettered it?

(*Mr Meadows*) No, I think probably not. Specifically, in terms of the development and engineering people, you can see very clear characteristics in American education which prevent that from happening. The reasons why we have been able to find these markets is because we do not suffer from the stereotyped thinking which you see coming at us from our American competitors because their education seems to be so much more stereotyped.

1109. What about Germany?

(*Mr Meadows*) We have no competitor in Germany.

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MR JEFF MEADOWS  
and MR PAUL KELLAR

[Continued

[Lord Clitheroe *Contd*]

(*Mr Kellar*) There is a very clear reason for that; again, because we find Germany very difficult in some ways to sell our creative machines in, because the people who are tasked in our German customers with making the buying decisions are engineers looking at the specification of the machine. It is very difficult to write the specification of a machine like a piano; they have all got this many keys and ours is certain not to be the cheapest. I think the same attitude folds back into their research and development a little bit.

*Chairman*

1110. They rather work on the sort of market specification role?

(*Mr Kellar*) Just so, yes.

1111. Have you ever been a plc?

(*Mr Meadows*) No. We were a major part of the previous plc that we were part of.

1112. When you first started as Quantel you were a private limited company?

(*Mr Meadows*) That is right.

1113. Then you were bought by UEI?

(*Mr Meadows*) Yes, in what I think is almost a reverse takeover.

1114. Now you are a part of the Carlton Group?

(*Mr Meadows*) Yes.

1115. So you have never been subjected to the short-termism problems that we hear so much about?

(*Mr Meadows*) No, we have not.

1116. You have always been able to get on with your own job without worrying about your share price?

(*Mr Meadows*) I think that is true.

1117. Has that made a difference?

(*Mr Meadows*) Yes, I think it has, because our development programme and our decisions about development investment are entirely our own and are taken, I think, very organically. We are not as analytical about development investment as many companies are and as many plcs would require us to be, I suspect, and certainly as many investors might require us to be. We have, both with UEI and with Carlton, had some experience of dealing with investors, in terms of explaining to them our business and what we do, and I think, by and large, we have found that that has always gone very smoothly. Contrary to what we were hearing earlier,

we have usually managed to get an investment analyst to be upbeat about what we are doing without having to answer all sorts of questions about "What is your R&D investment this year; what are the products in which you are investing; when are they expected to come to the market?". We have taken perhaps a course of action that deflects those questions by trying to infect the analyst with our own enthusiasm for the business that we are involved in, and that generally works.

1118. By and large, do you get good support from your parent companies?

(*Mr Meadows*) Yes. It is early days for us with Carlton but I think what we expect and what will be the key to our continued innovation is that the touch of the Group is very light.

*Lord Erroll of Hale*

1119. Is it not a very risky way of going about it, almost in a dreamy way? There must surely come a stage where you run out of ideas?

(*Mr Kellar*) Yes, we do not sleep too well.

1120. Exactly. Surely at board meetings ... you have such routine things as board meetings?

(*Mr Meadows*) Yes, we do.

1121. You must occasionally tell each other your dreams and presumably you toss a coin as to whose dream is going to run for that month?

(*Mr Meadows*) We do not seem to have any difficulty in reaching a consensus about what we ought to be doing and I think that is probably because our culture insists that each member of the board, even the Finance Director, has an awareness of and an enthusiasm for what we are trying to do. What typically happens is that we talk about the possibilities that Paul and his people are working on and we generally come to a very sensible—at least it has proved sensible thus far—consensus about where we ought to be putting the investment money. We do write off our R&D investment immediately we incur it. Perhaps it is dreamy. We are not very systematic about revisiting the past and examining whether this particular intellectual adventure actually yielded a result. I think we have been remarkably successful—

(*Mr Kellar*) It is not true; we do that.

(*Mr Meadows*) You do it, probably!

*Lord Kearton*

1122. I was very interested in this organisational background because it is such a remarkable record. One's guess is that you work very informally, in rather a flat structure with no rated hierarchies, not an enormous number of memos flying round?

(*Mr Meadows*) Yes.



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MR JEFF MEADOWS  
and MR PAUL KELLAR

[Continued

[Lord Kearton Contd]

(Mr Kellar) Remember, this is a team of people which has been together for many years; that does help us a great deal.

1123. So the communications almost take care of themselves?

(Mr Kellar) Yes.

Chairman

1124. How big is your team of qualified scientists and engineers, roughly?

(Mr Kellar) It is about 50, the R&D lab, that is engineers, not counting drawing office, and so on.

Lord Kearton

1125. What sort of premises do you occupy?

(Mr Meadows) We are actually in three buildings in Newbury, which is not particularly convenient.

1126. Are they very up-to-date? What is inside those?

(Mr Meadows) The buildings themselves are not but the infrastructure within them is. We have made very heavy investment, as I said earlier, in computer-aided design and, although the drawing office and the production base are in a separate building from the R&D operation, we have networked the design system so that engineers can prepare a printed circuit design and it is shipped up the road electronically.

(Mr Kellar) In Newbury.

1127. Newbury is a good place to be?

(Mr Kellar) Yes. In fact, our main office in Newbury is a converted Spitfire factory which was built very hastily in 1940.

Lord Erroll of Hale

1128. They do not have board meetings, do they; they have seances in these buildings, and it seems to be working extremely well! Have I got the atmosphere right?

(Mr Kellar) To be fair, one character who is not here today would answer that better than either of us, that is Richard Taylor who is now our Chairman. He founded the company, he has been with it for ever, and he is, if you like, a very good medium, to pick up your analogy; he does have the ability to focus the thoughts like that and say, "Yes, okay, but guys this is what we are going to do" and that does work. It is not quite as bad as you would have us believe. It is perhaps unusual.

1129. ....

1130. ....

1131. ....

Lord Chorley

1132. Who are your competitors?

(Mr Meadows) That is a slightly difficult question to answer. They tend to be a variety of different companies depending on the product but, bearing in mind this approach which is to try to create a market rather than to fill an existing one, in the early stages of each of our products' lives we do not really have a competitor.

(Mr Kellar) You are competing for budget rather than for product, if you see what I mean.

(Mr Meadows) Because what we are selling is a different idea.

1133. So you are not in the sort of product-cycle rat-race where you have got to do your development so fast to beat whoever it is or you are up against it?

(Mr Meadows) The paint box perhaps is, again, a useful example. I think the product was in the market for five years before a competitive product appeared. Because of this characteristic of people not recognising immediately that it was a useful idea, it takes competitors a while to understand that there is a such a market and then it takes them a little longer to produce a competing product. I think it is an unusual business that we have managed to create.

1134. If I were to ask you the same question in five years' time, how would you answer it?

(Mr Meadows) I cannot answer it because I cannot foresee the future, but we are confident that we will be able to continue to do this.

(Mr Kellar) Well, you may be!

Lord Erroll of Hale

1135. Do you take the trouble to cover your ideas with patents?

(Mr Meadows) Yes.

(Mr Kellar) Yes. We are a bit sensitive on that subject. We have just won a very arduous case supporting the two master patents on the paint box and it was very hard work and we won it very thoroughly.

Lord Kearton

1136. Against whom?

(Mr Kellar) I am sorry to say against another British company. It was a direct copy and we had no choice but to go for them and we won the case and they have stopped. We are going to have to do the same thing in America shortly, which is a very frightening prospect, frankly, but, again, eventually it has to be done. Can I just make the point that we do not regard patents as the defence for our company's future; the defence is to be working on the next generation of machine. We have a few aggressive patents and a large number of defensive patents, obviously, as a matter of professional engineering, but we do not rely on them in any sense.

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MR JEFF MEADOWS  
and MR PAUL KELLAR

[Continued

*Lord Chorley*

1137. Do you find our patent legislation satisfactory?

(*Mr Kellar*) Knowing I was coming here, I asked our lawyer that this morning. The answer is yes, with a few minor exceptions. Having won the case once, we are finding it more difficult than we had hoped to shut down one or two other competitors which grew up during the course of that two-year period leading up to the trial. It seems to us that, having won, we should not have to fight the same case again on exactly the same attack, which we are having to do; but, broadly speaking, yes. I was asked to say specifically that we do not think that the Small Claims Court equivalent of the patents will help.

1138. I did not really mean the courts but our actual patent legislation. That is satisfactory?

(*Mr Kellar*) Yes.

1139. And registering everything, in America, for instance?

(*Mr Kellar*) That does not cause us a problem. We have something like 100 patents granted to us as a company.

(*Mr Meadows*) I think what we discovered in the course of this action is that, fortunately, we had a very good man drafting our patents. That seems to be the key.

(*Mr Kellar*) Interestingly, I wish we had been taught more about that in our education, pre-empting a question you have not yet asked. That is an area where a certain amount of commercial and patent law would be a very useful intellectual asset.

*Chairman*

1140. Perhaps as you have touched on it we can follow that up. Do you think that the education and training of British scientists and engineers is too narrow and should include more of company law, patent law, finance and so on?

(*Mr Kellar*) It would take only one course of eight lectures to make a major difference, that would be a great help; it is no big deal.

1141. It is a shortcoming at the moment?

(*Mr Kellar*) Yes, it is. I knew nothing at all about patents before.

(*Mr Meadows*) He knows rather a lot now!

1142. Do you finance your investment in development mainly through retained profits?

(*Mr Meadows*) Yes, entirely.

1143. And always have done?

(*Mr Meadows*) Yes, and always have done.

1144. That is because you must have a good return on capital?

(*Mr Meadows*) We get a very adequate return on the capital employed.

1145. ....

1146. ....

*Chairman*

1147. You are a very successful company and if you were public, leaving aside the problem of takeover, it would seem that you would be a very attractive company, especially if you can finance it yourselves?

(*Mr Meadows*) I think we believe so, yes.

1148. To see some of those figures would be, I think, very educative for us?

(*Mr Kellar*) Again, if I might ask you a question: I was very surprised by the £10 million number which Oxford Instruments quoted. Even with 50 people the amount we spend on development is relatively small; we use very small teams, very tightly knit, with an enormous test gear, and so on, and resources per person but not, frankly, that many people.

1149. To the order of what, a few million, £2 million or £3 million?

(*Mr Kellar*) I suspect so, yes. I do not know what our annual budget is.

*Lord Kearton*

1150. Presumably it varies?

(*Mr Meadows*) It varies, clearly, year on year.

(*Mr Kellar*) It is partly because of this trick of being able to deliver a machine before it is completely finished, which you cannot do with Synchrotron; we have this soft start ability, which is nice.

(*Mr Meadows*) We spend a lot of money on test equipment, on development tools and on components.

(*Mr Kellar*) But none of it has been wasted.

(*Mr Meadows*) We spend comparatively little on manpower. As Paul says, the R&D operation is about 50 strong and the teams working on individual projects are almost always single figures. Recently hearing that one of our major competitors has a 50-man team working on a clone of one of our pieces of equipment, we actually felt some relief because with a team of that size they will not make it. You cannot get the integration of the technology with the creative application from that kind of team, at least we do not think you can get it.

*Chairman*

1151. Is manufacturing technology very important to you? Do you invest a lot in that? You do your own manufacture, do you?



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[Continued

[Chairman Contd]

(*Mr Meadows*) Yes, we do, and we have invested far beyond that which our volumes would normally justify; we have put a lot of money into automatic insertion equipment, flow-line soldering, for a comparatively low volume product, and the reason we have done it is to get the reliability up. We have put a lot of money into the in-house ability to design integrated circuits, we have put a lot of money into the in-house ability to design multi-layer printed circuit boards, so I think we have tried to match a slightly quirky, off-the-wall approach to innovation with a very business-like approach to making the product. Also, I think there has been a determination not to yield to the Japanese in the area where British business fashionably yields to them, which is in manufacturing; we have kept our manufacturing strong and in-house.

*Lord Taylor of Gryfe*

1152. Your organisation sounds to me extraordinarily cost-effective, because you mentioned one of your competitors spending a great deal more but some of the things you have just mentioned in your list of developments, they do take enormous numbers of people in other firms for a breakthrough of knowledge?

(*Mr Kellar*) I do not mean to be flippant but we really were very encouraged to hear that these people had put 50 people on a competing machine and, again, in California, they had not a chance; they had got 20 hardware engineers working on it, 20 software engineers and 10 project managers.

*Chairman*

1153. Is it the exact parallel sort of equipment to yours?

(*Mr Kellar*) It was a direct competitor for one of our machines, where the largest number we ever had on that team was six people.

(*Mr Meadows*) From the first showing of that machine we can see that they have missed the point.

1154. Would you put that down to your having invested such a lot in the facilities for your designers, computer-aided design and that kind of thing?

(*Mr Meadows*) No. I think largely that goes to the strength of the development team and the willingness to indulge in lateral thinking, and probably more than anything else the intense effort that we put into getting under the skin of the person who we expect to use the equipment. The key person in all of our developments is the person who is going to use it. Very early on in Quantel's history a decision was taken to hire a top-flight graphic designer, in other words to pick up someone who represented our customer, to bring him into the company and to let him infect us with the requirements of the market-place.

*Lord Clitheroe*

1155. Do you have any impediments that you put in the front line that impede your growth?

(*Mr Meadows*) Of course, people are always a problem. Because we are so dependent on the kind of development that requires a small team, stepping on to the next development, adding developments, is always difficult for us. I think the single thing which is causing us most difficulty at the moment, though, is not at that end of our business, it is at the other end, and it is the impact of high interest rates on the investment decisions of our customers. We are not borrowing money to fund our projects so it is not so much a problem for us, but time and time again we have a customer in our hand who wants our equipment, who believes he can make money out of using it, but can he persuade the person who is going to be lending him the money? The hell he can! More and more we are getting drawn into that debate between the customer and his source of finance and I think the most difficult issue we are facing at the moment is helping customers persuade sceptical investors that they can run a business based on our very expensive equipment.

*Lord Taylor of Gryfe*

1156. Do you not run a leasing business?

(*Mr Meadows*) No, we do not.

1157. Might that not be the answer?

(*Mr Meadows*) Possibly. From the point of view of Quantel, that is not our business. I guess we have not felt comfortable about the idea of getting into leasing.

*Lord Clitheroe*

1158. Would you not have some impediment in growth because of the sort of small-scale structure that you have in your company, and actually to have to grow very much faster would probably be rather painful?

(*Mr Meadows*) I am constantly pestering Paul to try to expand the development resource and he is constantly coming back essentially saying, "I cannot make it any bigger and keep it as good as it is".

(*Mr Kellar*) I would rather have one good product a year than two less good, is the simple-minded view we take.

(*Mr Meadows*) Nevertheless, you have to grow to live, so we are finding ways to grow and I suppose we are getting, year on year, more and more out of the resource that we have. The resource itself is not growing very much, to be honest.

*Chairman*

1159. Taking your point that you want to maintain quality, could you grow if you could get more good people of the standard you have now?

(*Mr Kellar*) Yes.

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[Continued

[Chairman *Contd*]

1160. So that is the limiting factor; more good people of the standard you have now?

(*Mr Kellar*) I am sorry, I do not know how to put this other than to say that they have to be very good to make these machines; it is a difficult problem.

*Lord Chorley*

1161. This is not a matter of training, as such; it is a matter of innate capability?

(*Mr Kellar*) I fear that it may be. I heard the same question earlier and was thinking about it. Sir Martin Wood is a particularly brilliant, born engineer and it was very difficult for him to answer that question. I have a feeling that there is an innate element in some of our engineers.

*Chairman*

1162. Innate in the design element, particularly?

(*Mr Kellar*) I think so, yes. One or two of them have this ability to see in advance solutions that are obvious with hindsight.

1163. Can you see any way in which action might be taken, either by industry or Government or educational institutions, to create, develop, encourage more of those people to appear and be available?

(*Mr Kellar*) It is very interesting, to answer that obliquely, that we have made it our business to have as close a relationship as we can with the local sixth form school, in an attempt to encourage that locally, and it is quite heavy going because the moment we start to get to know some of them and introduce a sort of free-thinking, innovative style they run into trouble with some of their teachers for not sticking to the course.

*Lord Kearton*

1164. You are not financing anyone through university, or anything like that?

(*Mr Kellar*) A few, yes, but only casually.

1165. There has been a great proliferation of business schools in this country and some of them are modelling themselves on Harvard with case studies. Would you be willing to be the subject of a case study by any of the academic professors?

(*Mr Kellar*) Again, if you will forgive me answering this bluntly, only if you think it is somebody who would not be horrified by the very way we work.

1166. I thought it might be a useful corrective?

(*Mr Kellar*) That is true, yes. A lot of us have never worked anywhere else. I came to this company more or less straight from university.

*Lord Chorley*

1167. What is the turnover of your company, in pounds?

(*Mr Meadows*) It is £60 million-odd.

*Chairman*

1168. That is just under half of UEI; £163 million or something?

(*Mr Meadows*) Carlton is significantly higher.

1169. Yes, Carlton.

(*Mr Meadows*) In UEI's terms, we were probably something like half, I think.

1170. You have explained some of the reasons for your success; are there any other points? You have been very successful, you have grown, you have got very high quality products, you are making a good return on capital?

(*Mr Kellar*) There is an element of luck, as well. We happened to start our business in digital television basically just at the time it became technically possible.

1171. And the market was expanding?

(*Mr Kellar*) The television market has expanded steadily again; the market for our products was nought when we started. A group of people happened to come together at a good time.

1172. At the right technical time?

(*Mr Kellar*) Yes, just so.

(*Mr Meadows*) I think that is actually one of the continuing things that we try very hard to get right, though, to choose the moment to apply technology to a problem. We have many ideas bubbling in the lab and in the company whose time is not right, and the ability to recognise that the time is not right is as important as the ability to come up with the idea in the first place. You see many companies fail because they try to introduce something when the technology is not really ready, when the economics do not work; the product is wonderful but it is simply too expensive and nobody will buy it.

1173. Do you think that your technology-led approach, as you have described it, would have been much more difficult if you had been a plc?

(*Mr Kellar*) I confess I do not see why that would be.

(*Mr Meadows*) It would depend on who was running the plc, I think.

1174. Simply because the people who invested in you might require quicker returns than you could give by that sort of approach where you have to develop the market?



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[Continued

[Chairman *Contd*]

(*Mr Meadows*) To be perfectly honest, we have not had to confront this problem directly but on the basis of the encounters we have had with analysts I do not think it would be a problem. I think it is simply a matter of changing the agenda of the discussion with the analyst. Basically—this may sound arrogant or it may sound naive or it may sound both—I think we would succeed in answering a different question, and the reason why people would invest in our company, I believe, is that we know what we are doing, we have a very good track record of success in it and we have plenty of ideas to pursue in the future. I think we would expect both the management of the plc and the investors to invest in the people and to judge the people on their track record and to have a little faith in their continued ability to do what they have done well in the past.

(*Mr Kellar*) Basically, that is all we have got.

*Lord Erroll of Hale*

1175. In an old aircraft hangar?

(*Mr Kellar*) That is right, yes.

*Lord Kearton*

1176. We had a submission from one member of a management school which analysed in some detail the failure of the Advanced Passenger Train. He came to the conclusion that it was entirely an organisational failure, not the engineers. In fact, the whole culture and the whole background of the senior management on the railways at that time was such that the chances of it ever working were zero because there were no sufficiently strong product champions within the organisation, not sufficient people who understood it not sufficient people with faith in it, and so on. If the same chap did a study of your organisation it might be interesting?

(*Mr Kellar*) Why we are a little bit cautious about that is that we went through a post-acquisition audit after we were bought by Carlton—and it was a very highly-paid firm of accountants whose name has been mentioned here earlier this afternoon—but it was a joke, frankly; they completely failed. They found out less about the company than you gentlemen have this afternoon, frankly. It was a complete waste of time and we are perhaps a little bit sceptical.

Lord Taylor of Gryfe] I happen to have been a member of the Railways Board when we made the decision to go for the APT, and let me say that while some of us had certain doubts it was sold to the Board by an enthusiastic engineer who was fascinated with the technology implications. I just want to get that record straight to clear my own conscience.

*Chairman*

1177. I cannot allow Lord Taylor to get away with that. I was on the Board, too, and the failure was simply due to the fact that no project director was ever appointed who had full charge of it.

(*Mr Kellar*) It is interesting that you have used the phrase “product champion” twice this afternoon amongst yourselves. We do that. I do not think they are called that but that is what happens, that people, possibly more than one person, are this. It is the answer to your question, how do we meet these deadlines; that is exactly what happens.

*Lord Kearton*

1178. We have had some astonishing successes brought to our notice, of which yours is a spectacular example, and we want to know how can we translate this into wider fields?

(*Mr Meadows*) I must confess that, having given that some thought, I do not know that we can be of very much help. What has happened within our company I think is the result of a unique set of circumstances and it is quite difficult to know what lessons could be learnt and applied from a textbook to other businesses. Among them, though, are that people are of primary importance, that an organisation (at least, our organisation) runs largely on enthusiasm, above all things, and that if you can succeed in infecting an organisation with an enthusiasm for a business or for a product or for an objective, it is amazing what you can do.

(*Mr Kellar*) Can I turn back to questions about the APT. Is it fair to say that there was a large body of opinion inside British Rail itself that did not want it to work?

1179. Exactly so.

(*Mr Kellar*) I think that we could not make anything on that basis in our company either.

1180. That is what he says, that it was organisational failure. There were so many entrenched ways.

(*Mr Meadows*) We should recognise that in a company of 500 people it is a lot easier to have a consensus as to what you are shooting for than it is in a much larger company.

*Lord Kearton*

1181. The Japanese have succeeded in maintaining this innovative flair in quite large companies.

(*Mr Meadows*) Yes, but it is very hard to do that with Englishmen or Welshmen or Scotsmen, I think, because it requires that somehow the individual has to submerge his identity for the good of the whole, as it were. In a smaller company you can make it work without people losing their individuality, I think.

Chairman] I think we ought to bring this very interesting discussion to a close because we have

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[Lord Kearton *Contd*]

another witness here to give evidence. May we thank you very much for the frank way in which you have answered our questions and the insight you have

given into your company, which has been extremely helpful. Thank you very much for coming and spending so much time with us.

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PROFESSOR MICHAEL E PORTER

[Continued

**Examination of Witness**

PROFESSOR MICHAEL E PORTER, Harvard Business School, called in and examined.

*Chairman*

1182. Professor Porter, thank you very much for coming along. I do not think that anybody has read the whole of your excellent work but we have read some abstracts from your book and comments on it. We thought it seemed so very relevant to our investigation that we are most grateful to you for fitting it in to a very busy programme.

(*Professor Porter*) It is not only a pleasure but an honour to get the chance to speak with you and I just want to tell you that these investigations do not go unread or unheeded. In fact, I remember distinctly, in the course of doing the research on this book (that you have not read yet but hopefully I will persuade you to read eventually) that I actually drew on some of the earlier work of the House of Lords in this area and I found it very helpful to me; so, even for researchers it is important.

1183. Would you like to say anything more by way of introduction?

A. I think at some point I would like to lay a little background that I think will be important for all of your questions.

1184. Yes, indeed?

A. It is important to understand the context in which one looks at the question of innovation and the breadth of the question of innovation in determining the prosperity of nations. There is a lot of discussion about competitiveness today, all around the world, and it is certainly a discussion that takes place in the United States as vigorously as it takes place in many countries. There is lots of confusion about what competitiveness really means. To me, anyway, the answer to that question is very clear.

The only meaningful definition from a national perspective is "productivity": the ability of a nation to deploy its resources, its human and monetary capital, very productively to generate a lot of output for every day of work or every dollar invested. Productivity is the result of two things. It is the result of skills, the amount of skill you bring to the task, and it is a function of the technology that you apply. High and rising productivity demands innovation, continuous innovation in the broadest sense of the term, throughout the economy; innovation not only in the product or the process, but in marketing methods and ways of performing a service, in all aspects of business enterprise. Innovation, in turn, is what leads to "upgrading" in the economy, the seeking of higher and higher forms of competitive success, continuously in a nation.

Innovation is not a little issue in the economy, it is the central issue in economic prosperity. The capacity of the nation's economy to innovate in the broadest sense of that term literally determines its economic prosperity. It is the capacity to innovate

that made Britain the greatest industrial power in the world. It is the capacity to innovate that next made America the greatest industrial power in the world. It is the capacity to innovate that is now making Japan the greatest industrial power in the world. No nation ever starts out with the capability of being at the frontiers of innovative capacity—the US did not, Britain did not, and Japan did not—but it is the capacity to get there and stay there that is really the fundamental issue.

I will give slightly more background before getting into the specific questions. Why is a firm able to innovate, in the broad sense of the term? Seeping into the debate on this subject is a misperception. What I found from looking at many, many hundreds of companies in well over 100 industries in a wide range of countries was that the capacity to innovate and the capacity to upgrade does not come from having it easy, it does not come from having a comfortable home environment, it does not come from having a monopoly in your field. Indeed, innovation and upgrading come from pressure, they come from challenge. Industries, companies and nations improve because there is a dynamism that comes from challenge and pressure. In commercial terms this challenge, this pressure, seems to come from a number of critical sources; one is demanding customers. It is very hard for a nation's industry to innovate and improve if the home customer is not sophisticated, knowledgeable and demanding. You would think that you could innovate by selling to foreign customers that were sophisticated; it turns out that that does not work in practice. The close proximity to the home customer very fundamentally shapes the way companies think about their products and processes. If you have sophisticated home customers that is a great advantage in keeping up with the innovation race.

A second source of pressure and challenge is capable, home-based suppliers of the critical inputs and machinery necessary for technical progress in the industry. It is very hard to be a world-class semi-conductor manufacturer without having home-based semi-conductor equipment manufacturing. This is not because you have to have home-based firms to get the machines, you can buy them on the global market. But without home-based suppliers, without firms that have their core activities located near your core activities, the flow of information, the testing of new models, the process by which technological innovation really takes place, do not happen as vigorously. You do not need to have home-based suppliers of every component and every machine but those that are very critical to the rate of progress in the industry. A third variable, and perhaps the single most important of any based on my research, is the necessity of having domestic rivalry, domestic competition, to spur innovation. There is a view that in global markets home competition no longer is relevant. That if you have

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[Continued

[Chairman Contd]

a foreign competitor in global markets that is equal to having a domestic competitor, that those two are indistinguishable. We did not find this in our research. We found that in the most competitive industries in every nation that we studied, and it was 10 of the leading nations, there was not one but often numerous domestic home-based competitors.

1185. This is an empirical study?

A. Yes, this is an empirical finding. Japan is a perfect case in point. There are nine automobile companies, there are 10 facsimile manufacturers, there are 15 TV set manufacturers, there are 34 semi-conductor producers and 112 machine tool companies which are vigorously competing in the home market.

Why would home-based competition be so decisive? This sheds a lot of light on the process of innovation. Where you have home-based rivalry you find that the process of information flow and imitation proceeds very rapidly. Firms look at each other jealously, they do not like it when the company down the street out-does them. Progress takes place. Multiple firms each do it their own way, but imitate each other's good ideas; that diversity of approaches leads to rapid progress. Where you have home-based rivalry you also tend to stimulate all the firms to look out of the country in order to export and expand their operations; they cannot satisfactorily survive simply on the home market. Firms are not comfortable because they have a monopoly at home, they are forced to export, they are forced to look abroad.

Domestic rivalry's importance goes beyond these reasons, however, because if you have a group of home-based rivals competing, this stimulates the formation of these supplier-industries that I was talking about as important. If there is only one company in the industry the suppliers will not want to take the risk of having only one customer. But if there are a number of publishing companies, or if there are a number of investment banks, suppliers will grow up. You will also tend to stimulate the process of skill-building. Again, one of the things which we found in our research to be critical was that today, to be successful in advanced industries, you need highly specialised skills, not a high school degree or a college degree but you need skills that are tailored to the needs of specific businesses: software engineering of a particular type or metal technology of a particular type. When there are a number of rivals in a nation, this attracts the attention of the local universities to develop programmes, and attracts the attention of young people who want to train themselves for a career. All kinds of benefits flow from having a group of local rivals fighting it out.

Here is a view that in international competition the way to stimulate innovation is to allow firms to get bigger, so they can gain economies of scale, avoid duplication of research, and allowing more collaboration. This idea is certainly a very widely discussed theme in the United States. Based on my

work, it simply does not hold. Though this theory is appealing it does not fit the empirical realities of why industries actually innovate. With that introduction, perhaps we can start talking about some of the questions. I know I have already said a number of things that are not without controversy but sorting these out is what this group's job was.

*Lord Erroll of Hale*

1186. I would like to coin the phrase "negative innovation", where a country's industrial structure goes into decline because it is lacking all the attributes for positive innovation which you have just described. Would you go along with that concept?

A. Yes.

*Chairman*

1187. Would you also feel it is very difficult to reverse that concept from negative innovation, as Lord Erroll describes it, to positive innovation?

A. Yes, that is right. One of the things I did not mention was that there are many other factors which drive innovation. In my summary I noted two or three critical factors. The problem is that they are mutually reinforcing in either direction. If you lack sophisticated demand, even if you have rivalry it is hard to produce true innovation. If you have a lot of rivalry but you lack the specialized skill bases it is hard to produce innovation. The problem is that a nation must get all the elements in place. On the other hand, if the decline process—negative innovation (to use your phrase)—starts happening then it tends to spread.

*Lord Clitheroe*

1188. How do you switch from a vicious to a virtuous circle, please?

A. That is an extraordinary task and, to give credit where credit is due, the policies of the Thatcher Government have to me, broken a trend line. I now see enough change in the British economy that I would say we are not looking at a little aberration, we have seen a break in the trend. I believe, however, that the agenda is very much unfinished as to whether this trend has been truly reversed or has simply been broken.

*Lord Chorley*

1189. I would like to pursue that. We are really talking about a country's culture, are we not, or an aspect of a country's culture?

A. An aspect of a country's culture, yes.

1190. I may say, I have been out and bought your book but it takes more than a weekend to read it. You will have read, because it is in your bibliography, Olson's book "Rise and Decline of Nations", which is an equally fascinating book. From memory, since it is years since I read it, in



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[Continued

[Lord Chorley *Contd*]

essence what he was saying was that countries get arterial sclerosis, in effect, and you really have to have something like a revolution or loss or a great war, or whatever. We were successful in a war, which may have been a bad thing, in that sense. We have not had a revolution since the 17th century and that was not much of one, anyway. One wonders whether this is the problem, that we have got hardening of the arteries. I am not yet convinced that in the last 10 years we actually have broken the trend line; it is a trend line which has been going on since about 1860 or 1870, as I am sure you know?

A. Let me just make a few comments. First of all, Olson's book is a very good book. The core of his argument is the notion that various constituencies within this society, once a nation reaches a certain point, will essentially form what he calls distributional coalitions. He talks about how groups will essentially try to freeze the game so that they do not have to play any more.

This is a piece of the problem. In some sense, though, my book says that the problem of decline is even worse than that. It is not just that people try to create monopolies for themselves but the country loses its skill-base, it that it loses its sophisticated demand, and so forth. As for whether this trend can be changed, it is clear that it is extraordinarily difficult because the decline is not simply a function of government policies; government policies can be changed. What is hard to change are attitudes and beliefs and values.

1191. And culture?

A. Yes, and culture. What are some of the critical attitudes and beliefs in Britain that get in the way? One is competition. In Britain many seem a little bit uneasy about whether competition is really a gentlemanly thing to do. Number two: complaining. How can you be a demanding customer if your instinct from birth is that if something is not going right you just basically are patient and wait it out? Number three: you ask a British person about what they do, what their job is, and they will mumble a little bit and quickly change the subject; you ask a German or an American and they will give you a lecture on their company, their industry and all the 16 things that they have done. The issue is attitude towards one's work, the way one sees it, the way one puts it in context. Number four: the value placed on entrepreneurship and the creation of new businesses and wealth. Each of those things, if you think about them in the context of my theory, affects demands, it affects rivalry, it affects motivation. The reason I said that I thought there was a break in the trend line is that I actually perceive that some of these very deep-seated attitudes and values are beginning to change in Britain, at least among the 20- to 30-year-olds that I come into contact with, the people that come over to Harvard Business School and the people that I meet here in the business community. Motivation towards work, willingness to work long hours, attitude towards new business formation, and starting new companies; I think these

things have undergone a non-trivial shift. But, having said that, Britain still has a terrible skill-base, it still has a capital market structure that I do not believe supports sustained investment in productive assets. Even though I think that there has been considerable progress in a very fundamental sense, I also believe that the agenda is unfinished. If the agenda remains unfinished, then there will be a flurry of activity and, like a shooting star, it will dissipate.

Lord Kearton

1192. A feature of the British Industrial Revolution was the enormous part played by individual entrepreneurs and innovators; equally true when Germany started to industrialise at the end of the last century, again a handful of people did it. In your own country, America, the huge growth of America was really 20 or 30 people, really major entrepreneurs and major industries. If you look at the Japanese history, post-war, it is about 30 major entrepreneurs, I am talking about a dozen, really, behind the whole Japanese renaissance. In your analysis, so far, you do not seem to have mentioned the critical importance of people of this kind?

A. It is indeed true, that at the root of any nation's prosperity is a group of some number of individuals who assume leadership positions. I argue, from my research, that where one finds entrepreneurship flourishing it is not necessarily a cause but it is also probably an effect. Think about the great Japanese entrepreneurs and what their names are and what industries they operate. They tend to be in consumer electronics and they tend to be in automobiles. Think about the great entrepreneurial names one thinks about in America today; they tend to be in computers, and so on. The environment that each nation provides tends to attract entrepreneurship to different activities in the nation, and where prestige lies in a nation is very crucial to where entrepreneurs direct their attention. I would not deny the role of the individual or of entrepreneurship. Indeed, the capacity to create new businesses is one of the fundamental determinants of innovation in an economy because large companies cannot fully take on the innovation task. We see countless examples in history of how large companies bottled up or blocked a particular line of inquiry because it was too painful and too disruptive. You need to have the capacity for new people to try new things in new companies in order for an economy to really prosper. Takes place even in Japan; there are a lot of medium-sized companies in Japan, too. I would argue, however; that one cannot put one's hopes on the entrepreneur, the individual, independently of the environment in which he or she works and that is simply the point that I am making.

Lord Taylor of Gryfe

1193. You make very serious criticisms of the educational system. First, you say that the teachers are inadequate. Secondly, you say that they cultivate this culture of non-innovation, or non-industry. I would be interested in hearing you comment on the



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[Continued

[Lord Taylor of Gryfe *Contd*]

quality of management skills in the United Kingdom as a contributory factor, and then an entirely different factor, but one which you introduced a few moments ago, about our capital markets being inadequate to finance innovation or industrial renaissance. What distinction is there between American capital markets' risk-taking and British capital markets' risk-taking?

A. Let us start on the educational side and let me emphasize that I am not nearly as knowledgeable as any of you about the British educational system in its full richness. As an outside observer trying to compare it with nine other countries, however I have spent some time looking at it, I did make those comments and I might make a few more. I think that the role and attributes of an educational system for the purposes of industry and innovation must be looked at somewhat differently from the relevant attributes of an educational system in some global cosmic sense. One can argue that education is valuable for its own sake, that educating people in liberal arts and to be good citizens is important to a society. I agree with all that. But from the point of view of industry we find a number of critical issues. One, the standards that are set in the educational system must be high and exceptions cannot be made. Whenever a nation moves to pass fail instead of grades or when it starts relaxing standards to deal with social problems such as minorities or disadvantaged groups, we find that the capacity of the educational system to generate the kind of people that are needed in industry is eroded. Number two: teaching has to be a prestigious occupation; it has to be viewed as an important and distinguished career, and there has to be adequate training for the teachers, not just in teaching but in the substance of what they teach, particularly in the scientific and technical areas. I think, from my experience, that this is one of the areas in which Britain is having difficulty. It is not that the teachers cannot teach in the sense of being a good pedagogue, but it is that they do not have a degree in biology or in physics or in chemistry or in math or whatever it is that they are teaching, which places a constraint on the kind of job that they can do. Teachers in Britain are not paid enough so the good ones leave and go into industry.

I think it is also important to recognise that what happens in the public educational system is necessary but not sufficient foundation for an advanced industrial economy. This is because, of course, what a public educational system can do is provide students with a base of relatively generalised skills and knowledge. But what is necessary for true competitive success in modern international competition is highly specialised, industry-specific knowledge and skills. Where we fall down in America particularly, and I think to some extent this is the case here in Britain, is in the intervening education and training between the public educational system and what companies can do. In Germany there is a marvellous apprenticeship system; we see the same kind of system in Switzerland and we see modifications of it in

Sweden. In Japan the company takes on an enormous burden of in-company training to inculcate high school or college graduates with lots of industry-specific skills. The problem in the United States and Britain is that the companies do some training but do not really accept full responsibility, the high school system leaves people relatively marginally qualified, and there is nothing in-between. The vocational system in our country is really very second-rate. It is not prestigious; nobody would want to choose it if they had a choice. These are just a few comments on the education area.

*Lord Butterworth*

1194. Does this suggest that you need some kind of relationship in training, probably at the post-graduate level, between universities and industry?

A. I believe the answer is very strongly yes. There must be some mechanism by which the specific skill-needs of industry are reflected in the curriculum and the allocation of resources within universities and even in schools.

1195. Yes, it goes further than that, does it not? I think it means that a lot of the teaching must come from those who are already in industry; it is not a thing that the academic can do alone?

A. That is right; although you can get fairly close to it. Let us take the southern part of Germany, ringing those marvellous automobile companies that are all down there: Audi, BMW and Mercedes are the ones that most people think of but there are also Porsche and Opel and the others. Every one of the German universities in the southern part of Germany has a world-class department of automotive engineering, and there is very close contact between those faculties and the companies on a regular basis; so the linkage between academia and business can be a much closer one than is typical in our universities or your universities.

1196. Does this suggest that there should be some better partnership than presently exists between industry, business schools and engineering?

A. Let me start out by saying that the most important thing of all is to create more capacity to graduate more students in engineering. Before we talk about partnerships let us just increase the supply. In this country it is a cliché, but it is really true, that the notion of what an engineer is and the value attached to that profession must change fundamentally if industry is to be revitalized.

*Lord Chorley*

1197. Could you not argue the other way round: that in order to get the esteem into engineering you must create some real centres of excellence?

A. Yes, absolutely.



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PROFESSOR MICHAEL E PORTER

[Continued]

*Chairman*

1198. Is it not true that in Germany, in the great schools of engineering, such as Aachen and the like, the Head of the Engineering Department has very often been a managing director of a great engineering company before he goes there?

A. Yes, that is common.

1199. It hardly ever happens here?

A. It would hardly ever happen here, I can imagine that. Let us stipulate that we increase the supply of engineering places and engineering faculties and that we figure out some way of changing the perception of engineering so that bright young students would be attracted to that profession. What sense of partnership do we need from there? There does need to be a close and regular contact between the industry and the engineering schools. As for business schools—I am perhaps a bit radical on this point—I believe that business schools ought to be graduate education, that a business school degree should not be one's primary degree. Students should get training in science or biology or some other field and then the business degree should be a way of helping to translate and enhance those skills and apply them to management. For example, at Harvard we do not have any undergraduate business training whatsoever; everybody who comes to Harvard Business School has a Bachelor's Degree in something. We like to have a lot of them in engineering, science and math, because we find that people with these skill bases can be very effective in industry. With respect to the partnership between business schools and industries, I think a business school simply cannot function without a very close partnership with industry. Certainly in our institution we foster that in every way possible.

*Lord Butterworth*

1200. It is sometimes said, is it not, that some business schools are excellent for training people for commerce—banking or insurance or whatever it may be—but are less able to train people for industry and that you cannot do that without some kind of rigorous connection between the business school and engineering? I am not saying that Carnegie Tech is preferable to Harvard at all but there has to be this intimate relationship?

A. I think that your point is a growing realisation in all business schools. We have got to remember history. Business schools used to be nice folksy places right after World War II, not much theory, not much substance, pretty loose stuff. Then there was a very famous report—I think it was a Carnegie Commission report—which said that business schools were not training rigorously enough. So what happened was that business schools took a right turn and all of a sudden went academic. Business school curricula went from very intangible explanatory subjects such as leadership to teaching rigorous models and theories. In the process the whole notion of scientific management and the

importance of capital budgeting techniques was fostered. In the last five years, though, we have seen another rather remarkable shift. Business schools all over the world are requiring courses on the Management of Technology and on Operations Management and all kinds of other nitty gritty industrial subjects.

Having said all this, if I was picking the leader of an industrial company I would pick somebody who had a very strong scientific or technical background. Hopefully, also with some good management training on top of that. My answer to the question of what business schools can do to promote a better understanding of technological innovation is that we need fewer people who have only business school training and more people who have technical and scientific training.

*Chairman*

1201. If we go along your line of thought, with which I am very sympathetic, that you get a science degree or a maths degree or an engineering degree and then you go to the business school, do you need more than six months or a year at most at business school?

A. Perhaps if you worked hard you could accelerate it; I think at the MIT they have a one-year intensive programme. We have programmes at Harvard for 35-year-old, experienced executives that in 14 weeks cram a lot of the MBA programme into a 13- or 14-week, six-day-a-week programme.

1202. Your main programme is two years?

A. Our main programme is a two-year programme.

1203. With a first degree before that?

A. Yes.

1204. Do you think that that is about right?

A. I could not give you a strong argument for why it could not be a compressed one-year as opposed to a two-year with a summer vacation.

*Lord Taylor of Gryfe*

1205. Chairman, could we move now to capital markets?

A. Innovation of almost any sort requires investment, investment in a variety of different forms—investment in skills of people, investment in R&D activity, investment in physical assets such as new plant, new equipment, and new machines. Interestingly enough, much of the investment needed to innovate is not treated as an asset, because it has to be written off as an expense. You can spend hundreds of millions of dollars training your employees but it is not viewed as an asset on your balance sheet; you can spend hundreds of million of dollars doing R&D, is not viewed as an asset on your balance sheet, the scientific base that you have

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[Continued

[Lord Taylor of Gryfe *Contd*]

created. This very fact alone creates a bias against innovation and a nation needs very strong institutions to offset that bias. In Britain and in America we have gotten into a situation where the ownership structure of companies is very substantially in the hands of institutional investors—insurance companies, pension funds and so forth. Those institutional investors, if you look at how they are motivated, have very clear incentives to produce rapid steady appreciation in the portfolios of the shares they hold. They are looking for companies that will appreciate quickly, particularly given the fact that both America and the United Kingdom have made what I think was an inappropriate policy choice not to provide any incentive for long-term capital gains. Whether it is ordinary income or whether it is a capital gain due to long term investment, these are treated the same from a taxation point of view. Without any offsetting incentive, investors in both America and Britain are looking for companies to produce share price appreciation in the short term. In such an environment, when managers take share prices seriously (which I think they do) this gets in the way of the kinds of activities necessary to produce sustained investment. Instead, what you have is companies seeking to show rapid improvement in their sales or profits through mergers and acquisitions. What we have is buying instead of building. What we have is merging instead of creating. This is very bad for a national economy.

Why does this not happen in Germany and Japan? You are all familiar with how different the ownership structure is basically, the price of shares in both Japan and Germany has been irrelevant to the companies, they do not care; at least they have not so far, though this may be changing. What matters is the permanent holders of stock—the large banks, the insurance companies—who never sell the stock. In Japan we have this unusual situation where stockholders are often other companies that are often linked either because they are suppliers or customers. It is in the interests of those permanent holders of shares for the company to prosper in the long term and to keep investing, so that 20 years from now it is a great company; whereas there is no such incentive in the UK and the US.

This is a rather fundamental issue and the current modes of thinking in finance theory are counter-productive. The current buzz-word is “neutrality”. To have all forms of income treated equally, all forms of investment treated equally. I think that there are certain forms of investment which create a higher social return than others and that we should be providing positive incentives for long-term investment in assets and in other corporate investments which lead to jobs and productivity growth.

*Chairman*

1206. You referred to takeover pressure. That is part of the pressure that you are worried about which makes for short-termism because it makes people go for short-term results?

A. Takeover pressure is tricky. You want to have some discipline on managements.

1207. I think the management is another argument?

A. You have got to have discipline on management especially if you have got boards of directors that do not wield any real power. The situation in the United States. We have boards that are, by and large, selected by management. Unless there is truly a catastrophe, the board does not change the management. If the board has very little power, it is very important to keep some discipline on management through the takeover mechanism.

I believe that the way you structure the game in the kind of balance you create between the raider and the raidee is important. However, in America, for the first episode of this takeover craze, we probably have stacked the odds a little bit too much in the favour of the raider and this is actually being redressed today through lots of little changes in legislation.

1208. And we have, too?

A. I think that the British economy would be better served if takeovers occurred where there was evidence of pretty bad performance, not just a company that could be stripped of assets; it is a matter of the balance.

1209. So you think we ought to look at that balance?

A. Yes. Having said that, I think that the merger issue, as distinct from the threat of takeover, is a somewhat different issue. The merger issue has to do with competition and preserving competition. I think there is some confusion in Britain now about that, too. I only read things the day after in the papers, but it seems to me that there is a lot of confusion now about which mergers should be challenged and which mergers should not be challenged. There is the sense that “Well, it is now a global market, we are competing in Europe”.

1210. Do you think there would be anything in the argument, in the manufacturing sector, that one of the criteria as to whether you should allow a merger or not is whether the sum total of the merged company output would be likely to be greater than the addition of the two separate companies?

A. That is one criteria. But I must give you a slightly longer answer to that than you would probably like. Right now, the preoccupation in thinking about mergers and alliances is efficiency; whether by putting the two together we can gain



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[Continued

[Chairman *Contd*]

economies of scale or eliminate duplicative overhead. Efficiency is important, but what we have learned from 50 years of distinguished economics research is that it is not nearly as important as progressiveness, or dynamism, or technological progress. What we have learned about the economic causes is that a very small part of growth is due to efficiency improvement. Most of it is a function of technological progress.

1211. Do you include increased output in that progress?

A. It is the ability to produce more output with the same input.

*Lord Chorley*

1212. Productivity?

A. Yes, productivity. The problem is that when you allow two firms to merge who claim that they can gain a 3 per cent saving in overhead and therefore reduce their cost, you do create some kind of a synergy. But by eliminating the competition between those two firms you may slow down the rate of innovation. This is a broader European problem. There is too much preoccupation with one-off gains in efficiency and not enough with preserving an environment in which there is the greatest rate of progress.

*Lord Chorley*

1213. This goes back to one of the earliest points you made about upgrading, and certainly one of the things that struck me in your book is this constant reiteration of, "Forget about price competition, what matters is upgrading"; you obviously clearly place enormous emphasis on that. It is something which, in a way, I would say is foreign to us; everybody has been brought up to think, "Well, it is all about keeping costs down and getting economies of scale and cutting the overheads and so on and so forth", which is a very static concept.

A. It is a very static view of competition and it is a view that takes a nation only so far in its development. But look at what is great about Germany, it is the capacity to deal with high salaries and short work-weeks and a very strong currency through relentless improvement in the performance of products and achieving more productivity out of workers. That is what is driving the German success, and the same is true in Japan. I talk in the book about the Japanese auto industry. They started out with cheap sub-compacts and then moved to just-in-time and innovating on process technology, and now have worked their way up to having world-class technology in the product itself. It is such a process which sustains an advanced nation like Britain or the United States.

*Lord Kearton*

1214. I would like to ask you a personal question, if I may. Are you a consultant to various commercial industrial firms?

A. I work with firms all over the world and I have for many years.

1215. On a sort of *ad hoc* basis or on specific assignments or as a continuing basis?

A. I tend to work on specific projects in specific businesses as they come up.

1216. You advise on strategies?

A. Yes, on strategy. I spend about 80 per cent of my time being a professor and writing and that sort of thing, and I spend about 20 per cent of my time on outside activities, as we call them at Harvard.

1217. Generally speaking, do you find them receptive?

A. Very receptive. I find that, generally, when companies come to somebody like me they are really genuinely worried and do not know what to do; therefore, if you can give them a well-documented, persuasive case then they will change.

*Chairman*

1218. Have you done some for British companies?

A. I have done a little bit for British companies, two or three projects, not a lot.

*Lord Taylor of Gryfe*

1219. It is useful to you, too, as a professor?

A. Absolutely.

1220. Because I used to think consultants learned a great deal more from some of the companies that they investigated in the United Kingdom than they contributed?

A. That is right.

1221. I am very conscious of a recent experience of a British company bidding for a well-known company in Boston, Massachusetts. The bid was a fair bid, it was a fair price they put on it, the bidder is a very innovative company, it is a very successful company, and the company that was being bid for was obviously a company which required an injection of dynamism, a pretty sleepy company. What happened was that you then amended the law of the State of Massachusetts, which preserved the position of the existing board for so many years and protected them against the bid in a most shocking way. Along came a French company and they got onto it, and they said, "We will take it over but we will guarantee the jobs of the people in Norton" for the rest of time, practically, when in fact the injection of new management may have required the dismissal of some of the existing managers. I find that political influences in takeovers in the United States are becoming an abusive power and substantially interfering with the market; and that is a classic case.

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[Continued

[Lord Taylor of Gryfe *Contd*]

A. I can be nothing but embarrassed that Massachusetts is my home State. Anti-takeover legislation in the United States is simply nothing more than protecting special interests. I am happy to say that it is not a matter of our national policy. It is not something that the Bush Administration supports and I hope it never will be. But it is a natural result of the fear of both labour and management of what is going to happen. I think that it would be a very bad course for Britain to enact anti-takeover legislation of this particular type. As for redressing the balance, with raiders, making sure that you cannot have frivolous raids, this is probably appropriate. But many kinds of anti-takeover legislation, like this Massachusetts case, is a very bad idea.

*Chairman*

1222. Time is getting on. We have kept you a long time, Professor Porter, but I know Lord Chorley would like to ask one more question and I would like to ask one, if you can spare a little more time?

A. Yes, certainly.

*Lord Chorley*

1223. I could ask a hundred, but I will spare you! Let me make a generalisation, that we (Britain) have been quite good, thinking post-war, in the way our service industries have progressed both generally but more particularly in an innovative sense, particularly in financial services; but we have been not so good, in fact some would say lousy, in manufacturing industry. If you agree with the proposition, why should we be good in one and lousy in the other?

A. Let me just tick off a few elements. One: I think that there has been generally very high levels of competition in the service area, lots of firms, lots of rivalry. Number two: a number of the service sectors in Britain that have been innovative have been relatively unregulated and free to do what they needed to do. I studied auctioneering in my research. One of the reasons we found further success was that there had been relatively little intrusion in the business, unlike, say, in France or Italy. Number three: many of the service industries here have been acceptable, prestigious places to work for talented young people.

1124. This goes back to the whole point about esteem?

A. Yes. Also, Britain and America enjoy significant advantages in some of these services because of the language that we share, which makes it much easier to do business abroad than it does for a Japanese or a German. Another advantage is our university systems. With all their general faults they do produce a significant number of very highly skilled, very smart, and very well-trained people in the upper tier that would tend to go into a service industry such as consultancy or advertising.

1225. Because science and engineering is less relevant?

A. Yes, that is right. These are some of the conditions which help explain the somewhat better performance in services. Going much beyond that I would feel a little uncomfortable; but those are some of the things which come to mind immediately.

*Chairman*

1226. You mentioned the problem of accounting for research and development expenditure; it is written off each year, therefore it is not retained as an asset in the balance sheet. How would you regard this alternative: if you believe that the project is going to be successful in the future in producing a profitable product, you leave it in the balance sheet but you make a provision against it so that you have it on both sides of the balance sheet? That seems to me to be a much better half-way house than writing it off completely and losing it as an asset on the balance sheet because that is a deterrent to spending money, and better than capitalising it completely and not taking it off your profit and loss account which gives too rosy a view of the company.

A. That is an interesting idea. I had not heard it before and it certainly, at first blush, makes sense to me. The problem with capitalisation of research, which is technically possible in at least a number of countries, is the norms that have developed in the financial community. If capitalising R&D is viewed as radical, risky accounting and the prudent thing to do is to write R&D off, the change won't make much of a difference. You would think that managers could see beyond this, and have two sets of books—one for reporting and one for the way they measure themselves. But human nature being what it is even if you had a double entry, in the sense that you had R&D on both sides of the balance sheet, keeping it on the asset side would be valuable in and of itself.

1227. Then you have got a provision on the other side. You cannot distribute that because it is taken off the profit and loss account?

A. Yes. I think that is an interesting idea and should be considered.

1228. It is increasingly being studied by accountants here and I think it is a very good idea.

A. I would tend to extend that and say, if you are going to take that philosophy in R&D you really ought to take it to skill-building investment.

1229. Yes, training, too?

A. Yes.

1230. It has been a most fascinating afternoon. We are tremendously grateful to you. How long are you going to be over here, Professor Porter?



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PROFESSOR MICHAEL E PORTER

[Continued

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[Chairman *Contd*]

A. I have got two more days of work and then my wife is going to join me and we are going to enjoy your wonderful country for four or five days.

1231. I hope you will have a very successful visit and I hope, if you come over here again, that you will get in touch with us and we can have another talk?

A. It would be my pleasure.

1232. Perhaps we might get in touch with you later when preparing our report if we want to ask you any further questions; could we do that?

A. I would be delighted.

1233. We would be very grateful. Thank you so much for coming and answering our questions so very fully.

A. It was my pleasure. Thank you.





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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 13 June 1990

*Sir Robin Nicholson*

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WEDNESDAY 13 JUNE 1990

Present:

Butterworth, L	Flowers, L
Caldecote, V (Chairman)	Gregson, L
Clitheroe, L	Kearton, L
Erroll of Hale, L	Whaddon, L

Examination of Witness

SIR ROBIN NICHOLSON, FEng FRS, called in and examined.

*Chairman*

1234. Sir Robin, thank you for coming along and helping us today. We realise that formally you are here representing Pilkington plc, but you have such wide experience elsewhere that it would be a great help to us if by way of introduction you could give us any views that you would like to express on how you see the role of Government in encouraging innovation in industry in order to make it a lot more prosperous and effective.

(*Sir Robin Nicholson*) Thank you, my Lord Chairman. It is a great pleasure to be here. I hope that I can be of a little help to the Committee in this very important task. Thinking about the general question you put to me to begin with, my experience of innovation in manufacturing industry—and I suppose this goes for most of us—is limited to a certain sector, that is, large companies. My previous industrial experience before I went into the Cabinet Office was with a large company. My experience since then, as you say, has been with Pilkington. Also, as a non-executive director of Rolls-Royce and BP, I have had an opportunity to observe their activities in innovation. I have no direct experience therefore of the smaller company sector, which I believe is very important in innovation. The other point to make in introduction is that you have received written evidence from three organisations with which I am associated, that is, the Centre for Exploitation of Science and Technology, the NEDO Innovation Working Party and the CBI Research and Manufacturing Committee. I have therefore had some experience in my contribution to each of those activities. Although in no case is innovation their only role, innovation obviously has played a large part in their work in the last two or three years. From all this experience I think my overwhelming view is that it is much more likely that Government, however well intentioned, will interfere with the innovation process than that it will promote it by actions that it takes. I come from the school which believes that man is a naturally innovative person and that the ordinary competitive market place demands innovation in any sensible company, and when companies fail to innovate or employees fail to innovate it is usually because they are prevented from doing so rather than because of a failure of attractions, of subsidies, of incentives or of whatever it may be. The natural process is one of innovation. If one looks at the 1980s, the decade has been a satisfactory period for innovation in British industry. I would not say any more than that. I think it has been a more than satisfactory period in several other aspects of British industrial life which are very important in innovation, things like improved productivity, greatly improved profitability, which is

arguably the biggest single thing that happened in the 1980s to enhance innovation in British industry. I do not think that tremendous growth has been made in innovation. When as chairman of the NEDO Innovation Working Party I presented that report to the NEDO Council a year ago I made the point that the prosperity of those parts of British industry that survived the traumas of the 1980s has depended on doing fairly simple things in life better than we used to, things like managing the business, improving productivity and getting industrial relations on to a much better footing. The NEDO working party of which I was chairman in investigating innovation in British industry did not find that, if one looks at British industry as a whole, there is yet an understanding of the absolute imperative of innovation that however good today's product is it will be obsolete tomorrow, however low cost today's process is it will be a high cost process tomorrow and however good today's quality is it will be shoddy by comparison with what the customers demand tomorrow. The total inevitability of that is not something that is yet at the forefront of the mind of British industrial management in the way that it is, for example, in the minds of management in Germany and Japan in particular. Therefore I said in my introduction to the NEDO report that I felt the improvements that had been made in British industry in the 1980s could not be repeated in the 1990s simply by doing the same thing only better. There is certainly more scope in the areas that I have mentioned. The improvements in the 1990s, I think, if we are going to have a leap forward, have to come in a much greater attention to innovation. That is obviously one reason that I welcome your initiative at the beginning of this decade to study innovation in manufacturing industry. The NEDO working party came to the conclusion that when one looks at the various factors that influence innovation, including of course government action, the principal shortcoming was in the management of innovation. As to the evidence for this, if you look at British industry as a whole and the Working Party's survey of innovation in a wide variety of companies of different sizes, British and foreign ownership, London or south east based and regionally based, differing sizes and suchlike, there were and there are outstanding examples of innovation in British industry, and there was very little correlation between the people who were innovating successfully, whether they happened to be in Scotland or in the south east or whether they happened to be foreign or British and so on. The conclusion one has to draw from that, which the NEDO working party drew, was that the primary cause of lack of successful innovation is poor management of



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SIR ROBIN NICHOLSON

[Continued]

[Chairman *Contd*]

innovation. In the NEDO working party we therefore tried to analyse what it is that makes for excellent management of innovation in a company and to put this in terms that were very readable and very understandable by relatively small companies.

We ended up, as I am sure members of the Committee will know, my Lord Chairman, by producing what we have called the Innovation Management Tool Kit, which has been marketed this month and which we hope will be widely purchased by British industrial companies and will give a blueprint on how to improve management of innovation. If I may summarise what I am trying to say, I do not think government promotion of innovation is the prime way of improving the quality of innovation in British industry. I think that Government can certainly do things that harm innovation, and we have seen quite a bit of that since the second world war. I think that Government by creating a strong and prosperous economic environment can create the right conditions for innovation to flourish. However, I do not think that Government can effectively take the place of excellent innovation management.

1235. Thank you, Sir Robin. May we raise one specific point on the role of Government. I am sure we would all agree that innovation is a matter for industry, for directors of boards and for the management of industry, but are there not cases where a particular industry has got run down for one reason or another, an industry that has a market in the future but which for one reason and another has had bad management in the past and will find it difficult without some sort of assistance to get back into the market again, because if one does not have a good cash flow to finance innovation there are real problems? Is there not a case possibly for government help there in the form of what in the aircraft industry is called launch aid to get an industry back on its feet, as I think is done in Japan to some extent?

A. Yes, I am sure that must be right. You are talking of a recovery situation, my Lord Chairman?

1236. Yes.

A. At the end of the 1970s most of British industry faced a recovery situation. The way in which Government tackled that was to create an economic environment that allowed industry to increase its profitability up to reasonable levels for the first time for 20 years. Once industry had an adequate level of profitability in, say, 1983, 1984, the more successful and the more profitable companies started to innovate again of their own right, which I think supports my point of view that it is a necessary process for industry to do. One accepts obviously that there will be cases where the situation is too far gone for that. That is one situation. The second situation is where the project is of such enormous size that it is beyond the capability of any single company. An example of that at present—I am not suggesting that this is necessarily a good commercial

idea—is a Concorde successor. It is very hard to see any European company, however successful, risking enough of its equity to launch a project like that. At the other extreme I think it is very hard for some of the smallest companies. There have been many studies that have shown that in the United States one of the most effective ways by which the larger companies have been innovative is to watch smaller innovative companies and then at an appropriate time to acquire them. At that time you acquire the dynamism and innovation of the smaller company, you put in the resources of the larger company and it is an excellent mix. In those three areas—recovery, very large projects and small companies—however good the economic environment and however well managed a company is it can be very difficult to develop the right resources for innovation. I would accept those are three exceptions to the comments that I made. As I indicated in my preamble, however, I guess I have not really had direct experience of any of those. I was directing my comments to the broad mass of British industry, which of course does not fall into any of those categories.

*Lord Gregson*

1237. May I follow your comments with respect to British industry and the increase in profits. I echo the comments of the Prime Minister and Sir Alan Walters that far too much money was paid out in dividends from the increased profits, in directors' salaries and in company cars, when in fact spending on R and D, particularly D, was flat in that period. That is slightly different from what you have just said, Sir Robin?

A. I do not think so, no.

1238. Well, where did the innovation come from? That is what is worrying me.

A. There are several questions there, my Lord Chairman. I made the point that profitability recovered in the first three or four or maybe even five years of the 1980s. The statistics on industrially funded R and D show the beginnings of an increase from that time —

1239. But nowhere as much as the increase in dividends, by a factor of three?

A. I am trying to address one question at a time, if I may. Industrial R and D has started to move forward since the middle 1980s. Certainly in the companies that I know the availability of cash for innovation has not been a limiting factor. The need to give a reward to shareholders is part and parcel of our industrial way of life. The need to reward everybody, including directors, is increasingly part and parcel of the global market place. If UK companies had not done that we would have lost more people to America and to continental Europe than in fact we have. That I think was responding to the market place where, as I am sure you are well aware, salaries for senior people in the United



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Kingdom are substantially less than they are in continental Europe, and enormously less than they have been in Germany, yet this does not seem to have prevented the Germans from innovating very successfully. I do not think therefore that it is a question of either or. One can debate—and I would not wish to because I do not believe myself to be an expert on this—the ethics of top people's salaries and company cars. What I was saying, my Lord Chairman, was that in my experience since the middle 1980s availability of cash from internal resources and, where appropriate, from rights issues and other external resources has not been a limiting factor in the ability of British industry to innovate.

1240. But the Germans and the Japanese spend a great deal more percentage of turnover on R and D than British companies do, including of course Pilkington—£50 million out of £2.5 billion?

A. £2.5 billion—?

1241. Yes?

A. £3 billion, in fact.

1242. £50 million is your R and D?

A. No, about £70 million, in fact.

1243. Okay, I am a year out of date. It does not make much difference to the statistics.

A. The amount of money that we spend on R and D is totally comparable with that of our major Japanese competitors, Asahi and NSG. When you are comparing these figures, as you obviously know, you have to remember that the different sectors require very different rates of expenditure on R and D. The amount that is spent on R and D on the glass that goes into the window of this room is very different from the R and D that one spends on periscopes for submarines. When one compares company for company one has to analyse the market segments in which a company operates in order to make a comparison. We in Pilkington take our competitiveness in R and D, as in anything else, very seriously, and we analyse what our three major competitors, Asahi in Japan, PPG Industries in the States and St Gobain in France, spend as well as the many smaller competitors. We believe that we are competitive in our rate of spend on that.

*Lord Kearton*

1244. You put a lot of emphasis on the fact that management fundamentally has been inadequate in many areas, yet in the last 30 years we have increased the amount spent on management education: we have all the different business schools, the British Institute of Management and so forth expending great effort to improve management. If you look at the successful companies—take Hanson or BTR—they are financially oriented companies. Neither company so far as I know is noted for innovation, yet their record has been extremely good financially.

A. My Lord Chairman, there are certain industries in which one can be very successful without spending a lot on R and D and, if necessary, without doing a great deal of innovation. You can set out to make greenhouse glass doing very little on research and development. I have great admiration for what Hanson Industries and BTR have done in their own sectors. I do not believe that the style of management in those two companies is particularly appropriate for industrial segments where innovation and hence expenditure on R and D is much more important than it is in the areas in which they have specialised. I think it is really a question of horses for courses. I do not think that BTR would be particularly successful at managing Glaxo; and I do not suppose that Glaxo would be particularly successful at managing BTR. That is an absurd couple of examples really. I think there is a danger of over-generalising. Obviously you were not doing that, but I think one has to look very carefully at the nature of the industry and what is required in the way of management. To go back to your first point, I agree that the degree of initiative shown in our major business schools in terms of teaching people about management of R and D and management of innovation has been quite poor. We in Pilkington for many years have sent people across to MIT to a course called Management of Technology because we believe that to be the best course. The people who have come back have done very well in our organisation. In recent years—I am talking of the last two or three—I think some of our management schools have begun to realise that this is a weakness in their curriculum and a number of them are trying to address the issue. What the NEDO working party will show—and incidentally one of the members of the working party was Philip Norman, who is head of campus at Cranfield, one of the business schools which has taken a great interest in this area—is some of the skills that need to be taught better to make people better managers of innovation and better managers of risk. The working party report we produced has been criticised, in some ways justifiably so, as being simply a bible of good management. A great deal of management of innovation of course is simply good management. However, there are some very specific characteristics we identify that we believe separate out the best managers of innovation from those who are less good.

1245. We did a major report on Japan last year when we came to very much the same conclusions as those that you have just outlined about what should be the right policy for this country. One has this enormous cultural gap. If one looks, for instance, at Pilkington's own success it depended greatly on float glass, which was essentially a long term investment backed by almost a maverick chairman against the wishes of his board for a long time, very long term, and it paid off. Equally ICI—pharmaceuticals is probably their biggest profit earner now—for 20 odd years they were not making any profit on it at all. When I look at your own accounts you have a lot of



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new things coming along, but you are still enormously tied to your previous success in float glass. It looks as though you will have to have a great deal more patient money to carry on building on the float glass success. The other thing is whether the City will be tolerant. I saw the recent figures, which I thought were rather good, but they did not exactly have a rapturous reception in the City. Do you think the City's attitude in looking for short term results is inhibiting a company like Pilkington and other such companies, who must take a long term view?

A. If I may say so, my Lord Chairman, there are a lot of points there. Let me say a word about float glass first. Float glass in my view has been one of the great inventions of the century—probably one of the ten inventions of the century. If you look at any one company, however large, I reckon that you are jolly lucky to have an idea like float glass once a century; and you are jolly lucky to get it to work once in a millenium. Therefore—and I am not suggesting you were saying this—it is a great mistake for us in Pilkington to set out and say: where is the next float glass, rather the way that I think AT&T did after the semiconductor. A lot of their research was really finding the next transistor, and probabilities do not work like that. We do not organise our innovation in Pilkington looking for the next float glass. I believe that the probabilities of its being there are very small. If it does come up, I think we will recognise it and we will do it, but the probabilities of having another one like that are tiny. It has given us an enormous advantage, I think, in that people throughout the company since then—and probably before it—believe that innovation can happen and believe that innovation is good for profitability because it has been demonstrated. Therefore, you start off with the tremendous benefit of having won your first game, so to speak; once you have won the first test match, you believe that you can win the second, the third and so on. The confidence that this gives our employees—not just the technical employees, but all employees—and the confidence that it gives the board is something worth a tremendous amount. If I may turn to your second point, we can go to the City and we can say, we are spending £70 million on R and D and, yes, that is a lot of money, but we have a proven track record in pulling through profit from that. If you are company XYZ and you have not had a major success the City will say: well, show us, where has it happened; and you say: we have had a little success here and a little there and we are always expecting bigger successes in the future, Pilkington have the great advantage of having a good track record in innovation. Incidentally, this is not a commercial plug; the previous two major inventions before float glass in the manufacture of plate glass were also made by Pilkington so it was a company in the very best traditions of the early industrial revolution in this country which believed that innovation was the right way to go. If you go to Ironbridge or anywhere like that you can see evidence of it wherever you turn. There is therefore a good tradition, that tradition is understood by the City, we make every effort to

communicate that and we have a good track record. I think that the main effect of the pressure for short term results is to cause us to exploit our innovation as quickly as possible. I know from reading some of the previous evidence that has been heard in this room, my Lord Chairman, that that is a matter that interests the Committee a great deal. I cannot over-emphasise the benefits of completing an R and D programme in two years rather than four. I have said this before in other places. There is a tendency among managements that are not confident to believe that it is better to have ten programmes going for four years each costing £1 million a year rather than, say, two programmes going for two years each costing £10 million. One of the things that we have learnt from our successful track record in Pilkington, and certainly one of the things that I try to practise as a manager, is that whenever anyone comes up with a programme which is going to lead to a new process or product I say, tell me why you cannot do it in half the time. The usual answer is that it will cost a lot more money. I say, what do you actually mean by that; and what he means is a lot more money per annum, which is not the same thing at all. Therefore, we make a great effort to complete all programmes in the minimum time. There are certain irreducible minima like testing. If you have a new product that is a coated glass and you want to see what its weathering capability will be, you have to test that and that determines the length of the research programme. In my view, however, 99 per cent of R and D programmes in British industry could be done in half the time that they are. The cost in actual terms would be less and the market with which you end up is more likely to be the one you started off with because less time has elapsed. I have to say, my Lord Chairman, that when I say that to other industrial research managers their eyes tend to glaze over and they worry about going to the board to ask to spend £5 million a year. However, boards have to be educated that to spend half a million for ten years is much more risky than to spend £5 million for one year.

1246. I went to special demonstrations which showed that glass fibre reinforced concrete would revolutionise all the building of the future. About 12 years ago I remember going to another major demonstration which showed that fibre optics were going to be the great profit earner over the next two decades. What has happened to those two developments, which started with such enormous enthusiasm ten to 15 years ago?

A. There is nothing wrong in starting with enormous enthusiasm, of course. They both failed for different reasons. In the fibre optics case we backed the wrong technology, which turned out to be high cost technology. It was technically adequate, but it was high cost technology and the Corning process turned out to be the better process and we exited from that market for optical fibre. We still do have a fibre optics business, which is successful. It is small. It concerns cabling buildings for fibre optic



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communications in clearing houses, banks, large company headquarters and suchlike. That business is growing at 30, 40 per cent per annum and is very successful. However, I cannot pretend that it is as big a prize as it would have been if we had supplied the world with optical fibre. That then was a failure. The alkali resistant glass fibre for reinforced cement was a partial success. The reasons it was only a partial success were twofold. First, the technical properties of the fibre did not allow it to address as wide a market place as we had hoped. Secondly, and more importantly, I think, asbestos made a comeback. That particular research programme was predicated on asbestos being removed from industrial products and, of course, it has not been. What has happened is that the asbestos manufacturers have developed their manufacturing processes to remove the health risk. Asbestos is a jolly good natural fibre, in fact.

1247. How did these two cases affect the board's attitude to your £70 million a year spending?

A. In each case we had an internal inquiry as to what went wrong. We attempted to learn lessons from it. We have a number of failures. As the Committee will know above anybody else in the land, you do not do R and D programmes without having failures. If you do have R and D programmes without failures, it means that you are not being sufficiently vigorous and ambitious in your research programmes. We have several failures a year. I am sure that every company in the world has several failures a year. However, I think it comes back to the innate confidence that float glass and many other programmes have given us in that we are never satisfied with a failure obviously but we do not lose our nerve; we investigate why it is and we try to learn lessons. I did an analysis when I first joined Pilkington as to causes of failures in our R and D programmes. One important conclusion to which I came, which in fact I gave publicly in the Phillips lecture at the Royal Society a couple of years ago, was that one of the major causes of failure was programmes going too slowly and the market having changed by the time the programme is completed.

*Lord Gregson*

1248. Do you draw any inference from the fact that all your previous major developments eased into the market place were developed under a private family without the pressures of the financial market place?

A. There were still plenty of pressures from the shareholders. Since the shareholders were also the directors they had a very close financial interest in the company.

1249. That is quite different.

A. Well, it is not; you are betting your own future.

1250. That is quite different from talking to strangers, who do not know what the hell you are talking about.

A. I am sorry, "talking to strangers"?

1251. If you are talking to the City, you are talking to people who have no real vested interest in the company other than that they have put money into it.

A. That, I think, is quite a strong interest. First, we do not regard our shareholders as strangers who know nothing about the business. We attempt to speak to them on a regular basis and tell them what we are doing, warts and all. Since I came to Pilkington I have been a major advocate—to pick up a point that the noble Lord Lord Kearton made—of making it warts and all. The idea that all research programmes are successes is the most dangerous thing you can put across to the City, which you well know. Therefore, we are talking to them warts and all, we will tell them about our R and D programmes and we will tell them about our successes and about our failures. The question of whether, if Pilkington had been a public company, it would have done the float glass invention in the same way it did as a private company is one that will fascinate dinner table conversation for the rest of the century, and it is unanswerable. All I can say to the noble Lord Gregson is that if we had the same opportunity today we would certainly attempt to exploit it as vigorously as we did with float glass.

1252. Many American companies, of course, are buying in—in other words, changing themselves from public companies to private companies—because they are certainly disenchanted with the financial market place. Is this not a symptom of the same situation that Pilkington have gone through? The fact that there is a 30 per cent discount on your shares despite all the efforts you have made must be very disappointing?

A. Well, I am sorry, let us be very careful before we use those figures. With respect, my Lord Chairman, I do not think that it is a sensible use of our time to discuss Pilkington's share price over the years since the BTR bid lapsed. However, you expect a share price to be at its peak immediately a bid lapses. All I can say—which I think is the fundamental issue that you are addressing—is that we have had many innovations since float glass which are float glass divided by ten or float glass divided by five, and we have pursued them in a single-minded way to the benefit of the company's shareholders just the same as if we had been a private company.

*Chairman*

1253. What you are saying is this. You are now a plc. If the opportunity for doing a programme of the same magnitude as the float glass programme arose, in your view there would be no problem in going ahead with it?



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[Continued]

[Chairman *Contd*]

A. We would go into it with the same vigour and determination as we did in the 1950s.

*Lord Clitheroe*

1254. In view of the very successful track record you had with your research I wondered whether you find that the "not invented here" syndrome tends to prevail at all? Do you ever find that others have products that you wish to take aboard?

A. Yes, we do. We are certainly not free from NIH. It is one of the bugbears of innovation world-wide. Since Japan always comes into this, let me just tell you an anecdote. Last year we were licensing a certain product in Japan and I went to four of the major Japanese electronics companies to license it. One of them was the most receptive company to technology from outside its walls that I had ever met anywhere in the world. Another company had NIH—I was going to say "squared"—to the hundredth power, even to the extent that they said, "We are not interested in talking about your product because we do not believe that worthwhile innovations in this field come outside our research laboratory". That was a Japanese company. The answer therefore is, yes, we are always on the alert for licensing in. We have never been - this goes back in part to the optical fibre question that the noble Lord Lord Kearton raised—as effective innovators in the field of glass fibre as we have in the field of flat glass. Our glass fibre interests, which are quite substantial in the United Kingdom, are based on fiberising technology licensed from St Gobain. The entire St Gobain flat glass output is based on technology licensed from Pilkington. Therefore, it does not make sense to develop often second best technology when you can license the best technology from somebody else. We do try to do that. NIH is an attitude of mind. It is a very difficult thing to eradicate in a company. If I may go back to the management of innovation and the NEDO working party, there is no question that NIH is one of the principal inhibitors of innovation and that you should manage a company in order to reduce it to the minimum.

1255. So if a company has a great deal of pride it finds it very difficult sometimes to see that there is something new outside that?

A. It is a difference between pride and confidence, is it not? Pride in one's achievements is a fine thing. If one was not proud of one's achievements one would not go into the R and D business to begin with; it is a very strong motivating factor. The more confident you are, the more willing you should be to look at other people's innovations.

*Lord Flowers*

1256. My Lord Chairman, I want to go back to somewhere near where Lord Gregson left off and ask Sir Robin whether Pilkington have any lessons for other firms about how to approach the City and persuade the City that R and D is worth doing?

A. My Lord Chairman, this sounds like a digression, but it is not intended to be; I meant to say it in response to the noble Lord Kearton's remarks.

When one is approaching the City and talking about inefficiency the biggest single problem in proving that innovation will pay is the cost of capital. You have to beat the cost of capital in order to make innovation worthwhile and the higher the cost of capital the more difficult it is to beat. That also impacts on the comments that I made about doing the R and D programme as quickly as possible, of course. If you ask me what is the single greatest inhibiting factor of today in our programme of innovation I would say the cost of capital in comparison with our competitors overseas. It is rather arrogant, I think, to try to offer lessons to other companies. They are certainly not very different from the other companies with which I am familiar like Rolls-Royce and BP. I am sure that companies like ICI and Glaxo and in fact the pharmaceutical industry generally have a lot to offer on this. My view is that the shareholders understand the truth of what I said right at the beginning, that if you do not innovate you are dead eventually and your products will go obsolete, your processes will go high cost and your quality will go sub-adequate. What your shareholders are concerned about is, first, that you are spending an appropriate proportion of the resources on innovation and, of course, that the spending on innovation is far greater than the spending on R and D. You have to demonstrate that you are spending not only on R and D but also on the marketing of the project, activity which is needed successfully to exploit that. They are therefore concerned about the proportion of resources that you are spending. They are concerned about the way you select project A from project B. They are concerned about your control and how effective your controls are at stopping projects that are not going to work, which again is a source of enormous waste of money, and one reason why the R and D base is so inefficient. They are concerned that you have a clear exploitation plan and that you recognise the benefit of trying to get short term returns as well as long term returns. Let me give an example where I think only now Pilkington is beginning to be more effective. Let me take holography as an example. At a certain point when you develop a technology you see applications in your business. We have made major applications in two areas in particular: one is in holographic head up displays for our fighter aircraft; the other is in bifocal contact lenses. Now that is fine. Both of those were quite long delayed returns, the first because it was a military programme, and the second because it had to go through the usual Department of Health tests and their equivalent round the world. What you can do in the meantime is to say: we have these techniques, are there other applications for it that one can license out to other companies and thereby get a quick return, maybe just a down payment by saying, "Right, you can have a licence for the use of holography"—we did not do this one, in fact, but perhaps we should have done—"in



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[Continued

[Lord Flowers *Contd*]

supermarket checkouts". That did not impinge on our business at all. I think that it is the responsibility of the R and D director to be thinking all the time: this is a long term programme, it is going to develop returns for our shareholders but they are going to be delayed, is there some way in which we can get a quicker return on our investment by licensing out in areas outside our business. I think it is a rare technology that cannot be handled in that way. It is talking to the shareholders along the lines that I have indicated. My experience—I do not think it is any different from that of other companies which have done this—is that they are interested to hear, they are knowledgeable and they are understanding. What they do not like is for you to go and talk to them only when you have sunk £50 million in an R and D project which is about to go belly up and say, "Please will you forgive me".

1257. I am glad that your shareholders are all so wise as to listen to you. Does your stockbroker listen and does your bank manager listen? That really was the purpose of my question when I asked about City attitudes to innovation.

A. The word "City" is used to cover a multitude of organisations. As far as our merchant banks and the major clearing houses with which we deal are concerned, they are so involved with our business that they hear about this all the time. The answer therefore is, yes, they do listen. They are concerned if, as often happens in a large company, an individual subsidiary is taking a risk that appears to be beyond the strength of its own balance sheet. They may well seek an element of parent company comfort if a £10 million subsidiary is taking on a major risk. As regards the brokers, we frequently talk to our shareholders via our brokers so they are active in planning the meetings. We invest a lot of time in talking to the various constituencies in the City. I do not want to give the impression that it is all honey and light because it is not. Obviously they criticise some of the things that we do. However, I do not think that we have found the refusal to listen, the refusal to understand, which the City is widely credited with. I repeat, my Lord Chairman, that the major concern is the cost of money.

Chairman

1258. In the responses that you get from City institutions do you attach great significance to having had a good track record, for instance, in your float glass?

A. Yes, we do; and not only that. Several things have been done very well with float glass—I was not in any way involved so I can say this. Not only was it a brilliant invention but the whole commercialisation policy was staggeringly brilliant. More important from the point of view of the question that you have just asked, we have continued to invest a portion of the licence income in improving the process over more than 30 years now. The thirtieth anniversary of the announcement of float glass was February 1989 and we are still getting £20 million to

£25 million income from licensing patents and knowhow on float glass. You do not get that if you stand still. We have drastically improved the energy efficiency of float glass and we have drastically improved the range and quality of the product. We have moved forward and we have invested a proportion of our licence proceeds year in and year out, saying that we must go on improving the process in order that we stay ahead of the game. The net result is that when a new country comes in and talks to us and some of our original licensees about putting down a new float plant wherever it may be, we win more of those contracts than we lose because we are still, I believe, the leaders in float glass technology.

Chairman

1259. Does not the real problem arise when a company does not have a good track record and is trying to get out of a hole; it may have had a failure on a major development programme which, as you say, happens from time to time? Is that not the time that it is very difficult to get any City confidence to enable the company to go forward in its new development programme for a new product to get out of the hole that it is in? Do you have any ideas as to how that problem can be overcome?

A. I think that it depends on the nature of the business. As I indicated earlier, there are some businesses that are intrinsically innovation dependent. I am going back to the pharmaceutical industry. I do not think that you get any kudos as a company from going to the City—and several American companies are in this position right now, having had a poor track record in pharmaceutical innovation in recent years—and saying, we have had a poor track record and therefore we are not going to innovate. A quicker way of slowly bankrupting the company you could not devise! The right route therefore is to license in technology, I think. That is a much lower risk, quicker payback.

1260. To get started again and to build on?

A. Yes, to get started again. As is well known, that is what many Japanese companies did and, indeed, still do. If there was a critical area of our business in which we felt we had fallen behind, for example, let us say we wanted to stay in the manufacture of optical fibre, we would have tried to license the Corning process. Now as it happened we decided to exit from it. It comes back to pride and confidence. Licensing is a very effective route. It is not an alternative to doing your own R and D; it is another weapon in the armoury.

Lord Kearton

1261. It is fundamentally how the Japanese got away in the 1960s, is it not?

A. Yes, indeed.



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[Continued

*Lord Erroll of Hale*

1262. Would you regard yourself as a world leader in innovation? Is there sometimes a danger of complacency? What at this moment is your biggest headache in the management and innovation of your business; what is it that really bugs you at times when you go back in the train to St Helens?

A. First, my Lord Chairman, there is always the danger of complacency, yes. We have tried to structure our research and development in Pilkington to eliminate that complacency by internal competition. The development activity is very decentralised. There is strong competition between American, British and German subsidiaries, to mention only three, in the development of new products and new processes. We do allow an element of duplication in R and D expenditure to foster that. Our most recent innovation that I think will be enormously successful is an on line low emissivity glass, which drastically cuts the radiation from rooms to the atmosphere and hence improves the energy efficiency of windows to a hitherto unparalleled degree. On that programme there was tremendous competition between our American and British subsidiaries. We faced a point about two, two and a half years ago where we were seriously considering closing one programme down; we said, we must choose one of these, they are both jolly expensive and we must close down one. All the management text books would have said, I think, choose one. We eventually decided to keep both going for two reasons. First, they were being driven forward so much by the competition that we thought that more than outweighed the extra cost; secondly, we took the view that each would be better for different product ranges and therefore we would probably eventually run them side by side. That, I am glad to say, shows every chance of being the case. We try therefore to avoid complacency by having a fair amount of internal competition within the company. I made a directive when I came to Pilkington that 10 per cent of our research expenditure should be spent outside our doors so we always have the healthy infusion of other people's ideas. There are certain actions like that that one can take; that is just two of them. What is my biggest headache? Notwithstanding what I said before I think my biggest headache is that we are distributing our resources too thinly and we are not taking bold enough actions to throw larger proportions of the resources at individual projects. Our whole field of business is so responsive to innovation that it is very hard to take an area of business and say, we can put that on one side and we can save 0.1 per cent of sales on R and D because nothing very much is going to happen. I think therefore that my concern is the prioritising of resources and making sure that at the appropriate time we benefit from the global nature of the company and the size of the company by allocating enough resources to develop the thing really quickly.

*Chairman*

1263. You mentioned earlier the problem of capital cost. That is quite outside your control. It is quite a thorn in your flesh, as it were?

A. Oh, yes, I am sorry, my Lord Chairman, I was taking the noble Lord Lord Erroll's question to refer to what was in my control, and the interest rates are not within my control! It is obvious, is it not: if you do any DCF, if you feed in 15 per cent money it will be very hard to make money.

*Lord Gregson*

1264. I entirely agree about the cost of capital. There is a recent American paper which lays this out very clearly and has some fine mathematical examples worked out in it. The fact is that in this country we are constrained by the City, by the institutions, not to capitalise R and D. It would now be considered to be a very retrograde step indeed, and one's share price would be slaughtered. In fact, another statistic bears on it very clearly. I am sorry to quote Alan Walters and Mrs Thatcher again, but they both made this point. The dividend yield from manufacturing companies in this country is three times that of our competitors. How the hell can you spend money out of revenue on R and D effectively and still pay out three times the yield of our competitors on dividend? Is that not a much bigger constraint on our spending money on R and D properly in the company than even the high cost of capital?

A. No, it is not. To take the total amount of money that Pilkington spends on dividend, if you look at our total cash inflow from our operations the biggest single charge on that is capital expenditure, the next biggest charge would be tax, the third biggest charge would be R and D and the fourth biggest charge would be dividend. I am not saying that it is not important, my Lord Chairman, but it is not nearly as important as the cost of capital.

1265. But it is three times that of your competitors?

A. It certainly is not three times what PPG would be spending and it would not be three times what St Gobain would be spending.

1266. On dividend?

A. On dividend.

1267. Then you are a very peculiar industry.

A. No; we are a successful industry.

*Lord Kearton*

1268. I should like to go right back to the beginning when Sir Robin said that we were naturally innovative in this country; there was no shortage of innovators, but it was just this question of the management not being of the right kind to

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SIR ROBIN NICHOLSON

[Continued

[Lord Kearton *Contd*]

bring on the innovators. Do you not find any manpower limitations at all, Sir Robin? Can you get all the skilled people—the skilled scientists, the skilled engineers—that you need?

A. As of now, yes.

Lord Kearton] That is a very encouraging remark.

*Lord Whaddon*

1269. It sounds a little doubtful to me.

A. I said, as of now. I am very worried about what will happen in the next decade. We, like many companies, have taken a number of actions to try to maintain and if possible enhance our position through the next decade. The last decade and, indeed, the 1970s were a buyer's market for skills. We are, I think, moving to a seller's market. We have certain advantages as a company in attracting skilled people, I think, which we will obviously try to develop to the absolute maximum. We have always had a very proud tradition of the way we involve our employees in the company. I think we lose—this again sounds like complacency, I am afraid, but I am not complacent—a relatively small proportion of the people who come to work for us. I am not satisfied in any way with the proportion that we lose, but we do lose a relatively small proportion compared with some other companies. I suppose the final point, which in fact may be the most important, is that we have a large degree of flexibility because of our worldwide operations. Of the £70 million or so that we spend on R and D probably somewhere over one half would be spent in other countries. We have major research activities in the United States, in Germany and in Australia.

1270. So you are tapping an international group?

A. We are tapping an international group. In many ways the best place for doing research and development is in this country. The people whom we get are outstandingly innovative; they are very committed, very loyal and very energetic and they cost very little.

*Lord Butterworth*

1271. May I come back to something that you said right at the beginning about the function of Government. You said that Government should certainly create the conditions in which innovation might occur but that apart from that the best thing was for Government to keep out of the way. The Secretary of State at the Department of Trade and Industry has carried out what he believes to be important reorganisation in the DTI in order to

assist the development of innovation in industry. Is he mistaken in all this? What is the function of DTI in the future in relation to innovation?

A. The Chairman did of course correct me, perfectly properly, in my original statement to the effect that I was not speaking for the whole range of industry when I made the comment. One of the major roles for the Department of Trade and Industry in the future, I think, is with the smaller companies and with recovery situations, as he pointed out; but particularly with smaller companies and with awareness of technology in the smaller companies. In my view 99 per cent of innovation in smaller companies can be done without a single new scientific and technological discovery. The technology is there: it is in this country, it is all over the world. However, small companies find it very difficult to innovate on the basis of that technology because they do not have the resources to recognise its potential. The changes that successive DTI Ministers have made in putting more of the funding towards smaller companies I would support. Theoretically it has been to the disadvantage of Pilkington, I think significantly, but it is to the advantage of smaller companies, and I think it is right that that should be so. When I made my comments that it is the environment, well, it is not only the financial environment but I include critical important things about which you will have heard a great deal like standards. Our innovation in car windshields and, indeed, in aircraft windshields, can be hindered and from time to time is hindered by problems in standards around the world. The car windshield, as I am sure you know, is a product in which all countries have national standards of visibility and as to the size of piece of glass it will fracture into if something hits it. We have at present to meet different standards in different countries. Fortunately the European Community is moving towards a single standard on that. That is a major cost of innovation. It is not of course comparable to the cost of capital. However, if you have ambitions, which we have, to be a globally competitive company a major cost of innovation is meeting different standards in different parts of the world. It is a subject that governments find very boring and rather incomprehensible and certainly not very electorally attractive; nevertheless, it is a very important subject. The Department of Trade and Industry from time to time in the 1980s made a heroic effort in improving the standards situation. It tends to go in fits and starts and there is a lot to be done there still.

Chairman] Sir Robin, we are very grateful to you for answering all our questions so fully and for the help that you have given us. Thank you very much indeed.



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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 20 June 1990

**SMITHKLINE BEECHAM**

*Dr D R Winterman*

**BEAVER ENGINEERING GROUP**

*Mr A P Balding*

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*Ordered to be printed pursuant to the Order of The House of Lords of  
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WEDNESDAY 20 JUNE 1990

Present:

Butterworth, L	Gregson, L
Chorley, L	Kearton, L
Clitheroe, L	Taylor of Gryfe, L
Erroll of Hale, L	

In the absence of the Chairman, the Lord Butterworth took the Chair.

**Memorandum by SmithKline Beecham**

1. Being a pharmaceutical company with a very strong research base, SmithKline Beecham is totally committed to technical innovation which leads to effective and safe products coupled with technically and economically viable processes for their manufacture. The total R&D spend by SmithKline Beecham is currently £397m, of which £20m is spent on process engineering. In the main the criteria for adopting innovative manufacturing technologies are normal internal financial hurdles. A longer term strategic overview is taken for key products, however.

2. Because SmithKline Beecham is a transnational corporation, it is perfectly natural for the company to seek and consider new technology from anywhere in the world. The organisation is structured transnationally not only in Research, but also in Process Development (Production engineering in the Select Committee's terms). There are a number of projects currently active with overseas organisations. These include organisations in Germany, USA, Taiwan, Japan, Switzerland, Denmark, Sweden and the UK.

3. Technological innovation is essential for discovery of new pharmaceutical products and SmithKline Beecham scientists operate at the cutting edge of technology. Research and Development are responsible for product invention and data generation for initial registration. Within SmithKline Beecham the Manufacturing organisation is responsible (mainly through Process Development) for the introduction of technological innovation to maintain competitive advantage. Biotechnology as applied to the manufacture of therapeutic proteins is one area where the expertise currently lies mainly in Research although this is anticipated to change as more products are commercialised.

4. Two Government departments have been at the forefront of promoting technology within the UK, viz DOS via SERC and DTI via Support for Innovation and LINK.

*SERC.* In biotechnology, SERC has been extremely active in fostering collaboration between academe and industry. Setting up a separate Biotechnology Directorate was a worthwhile initiative since it took account of the fact that biotechnology traversed traditional scientific disciplines which was the basis of SERC organisation. The Biotechnology Directorate's initiatives in establishing "clubs" whereby groups of companies participate with universities in selecting research projects in a particular area of science or technology for joint funding by industry and SERC has been very successful. The involvement of industry in guiding university research has undoubtedly resulted in that research being relevant to industrial needs without in any way diminishing the quality of the science. Whilst these "clubs" concentrate on generic topics of interest to all participating companies, the links established have led to one-to-one collaborations between SmithKline Beecham and one of the Universities in the club on a specific topic arising from the general programme.

This approach together with the well established SERC co-operative award scheme has been instrumental in facilitating transfer of technology from the universities to UK companies and SmithKline Beecham has been an active participant in many of these initiatives in biotechnology.

*DTI.* The "Support for Innovation Scheme", now superseded by LINK, was an arrangement which SmithKline Beecham found particularly beneficial for undertaking high risk projects in areas where the corporation had relatively little experience. A very successful project carried out under this scheme from 1984-86 was in developing robotic systems for automating microbiological manipulations. The attraction of this scheme was that support was made available for one-to-one collaborations in areas of technology which were not necessarily, as in the above example, appropriate to university research. The LINK scheme which replaced it has tended to subsume the SERC club approach, although SERC remain a partner in what has become three-way funding of the selected research programme, viz industry, DTI and SERC. This arrangement offers no advantage over the original SERC club other than the potential to establish programmes in less fundamental areas of technology which would not be appropriate for SERC funding. However this has not proved to be advantageous because the highly competitive nature of the pharmaceutical industry precludes collaboration on topics other than broader, underpinning aspects of technology.

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5. Totally negative! The City seems interested only in short-term gains (especially in pharmaceuticals) and actually marks down companies investing in the future. Only Wall Street is as blinkered. Contrast investment practices in Japan and West Germany, where it is appreciated that long-term investment is vital for technology-based industries.

6. The Pharmaceutical Industry view on Patent life is well known. Governmental requirements for more extensive toxicology, pharmacology and efficacy data has extended drug development time and severely eroded effective patent life.

Other countries such as Japan and the USA have already recognised this and systems exist to restore patent life cover in certain circumstances. The recent European initiative to provide 16 years patent protection from the date of first marketing approval is encouraging. It is disappointing, however, that this will only be a Directive so that the extent and timing of the implementation is uncertain.

In our view it is essential that this legislation is enacted swiftly and to its full extent in order to encourage research based companies to remain innovative and competitive.

7. Government funding for universities is seriously affecting both the supply of first and higher degree graduates, and the quality of research carried out at British universities. Some aspects of the TI Wrigley report on supply of graduates may be relevant. Morale in university departments is very low as a result of the cumulative effect of cut-backs in Government funding for universities; purchase of equipment and supplies is difficult, funding of doctoral and post-doctoral researchers is restricted. We know that a number of high quality first degree graduates have chosen not to continue at university for a higher degree because of the low morale amongst the academic staff and the poor conditions. Also, whereas 20 years ago an academic career in a British university was something to be sought after, now many of our high quality scientists either go abroad for an academic career or come into industry. Although this is a short term benefit to industry, in the long term we do not benefit if our universities are starved of high quality researchers. Equally the cut-back on Government Sponsored Research Institutes (MAFF, MRC, SERC etc.) is not encouraging innovation and high quality research in the United Kingdom.

Furthermore, Government is increasingly trying to move the financial burden of supporting academic research into industry. At the same time universities, Research Councils etc., are increasing their expectation of financial returns to such an extent it is as expensive to finance projects at universities etc., as it is to finance them in-house. The effect of this is to reduce the number of long term projects and divert university research into shorter term projects with specific pay back.

With the decline of traditionally based manufacturing industries in the UK it is vital that we encourage innovative industries in order to maintain economic growth. This relies on a strong and productive education system. Universities, therefore, need to be funded in such a way so as to focus them on educational excellence and longer term research which is our heritage for the future. More enlightened countries continue to adopt this approach.

Once projects have been initiated the transfer of technology works well. The problem as stated above is that the projects are not initiated in the first place.

8. SmithKline Beecham have not considered participation in EC-sponsored research programmes, e.g., BRIDGE to be appropriate. The necessity to involve companies and research institutes from more than one country tends to lead to areas of research which are too general to justify SmithKline Beecham support.

9 and 10. It is considered that the UK equipment manufacturers have been rather slow to respond to the challenges and opportunities presented by biotechnology and much of the specialised equipment is manufactured overseas. The corporation welcomes the initiatives taken by DTI to stimulate interest amongst UK equipment manufacturers but feel that there is still much to be done. Whilst, if only for reasons of ease of after-sales service, we would try to purchase UK-manufactured equipment for our UK operations, the overriding consideration is the technical specification and cost. All too often this results in purchasing non-UK equipment.

In some European countries such as France and Spain, there are significant incentives to invest in research which may be expressed in the negotiations on pricing in that country. In a highly competitive market these concessions can represent the difference between commercial success or failure for a product. Given a good research environment in which to operate, there is a strong case to set up research in these countries.

11. No comment.



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[Continued

## Examination of witness

DR D R WINTERMAN, Process Development Director, SmithKline Beecham, called in and examined.

*Chairman*

1272. On behalf of the Committee I would like to thank you for coming to see us this afternoon. We have read your paper with great interest. You have had an indication of the areas in which we are interested?

(Dr Winterman) I have indeed.

1273. Is there anything that you would like to say to us of a general kind, before we get to the detail?

A. I think there is only really one point of clarification. Obviously what I tried to do was elicit views from a number of people throughout the corporation in regard to some of the very specialised questions, or what I regarded as specialised questions, and, perhaps not surprisingly, different views were expressed from different areas of the company in regard to what exactly was meant by innovation. I regarded innovation in terms of the actual manufacturing process and technology used for the manufacture of materials rather than innovation of discovering new chemical entities, which would be the remit of a research organisation within a pharmaceutical company.

*Lord Taylor of Gryfe*

1274. Is this not development rather than innovation?

A. We name it development, but the way that we look at developing an existing process may well use innovative techniques, so we may well change the science from chemistry to biotechnology for making the same product. It is obviously a subtle difference, but it has biased, I think, some of the answers that I have received from various people.

*Lord Kearton*

1275. Are you yourself a chemical engineer?

A. I regard myself as a lapsed chemist.

*Lord Erroll of Hale*

1276. Organic or inorganic?

A. Organic.

*Chairman*

1277. I think the way in which the Committee, as it were, has developed is really to be interested in whatever will produce profitability, growth and development, and we would not wish to draw the definition so tight as to exclude anything anyone wants to tell us in that field.

A. That is fine.

1278. So, what are the main factors which influence your investment decisions? How do you achieve a balance between maximising return and minimising risk?

A. In terms of the innovation process for discovering new chemical entities, that really is a very broad study from our point of view in terms of which therapeutic areas we believe are least well satisfied and have the biggest growth potential. So that really is a corporate decision as to which areas we would go into, and we would not change those areas, certainly not within a two or three-year period. That is the way we would look at the overall direction with which we would pursue pharmaceuticals. When it comes to actually investing in capital, in terms of putting in a new facility, then we would start to look at the risks associated, to calculate the financial returns, etc., and to look at the political stability of a particular country or whatever. So it really stems, I think, from that initial decision as to which therapeutic areas we would look at, and I do not think that the business climate as such actually affects that decision, only in regard to how competitors have placed themselves in those particular areas.

1279. So to what extent in choosing a therapeutic area, from time to time, would you be guided by promising research that you had recently been doing? Put it another way: to what extent are these decisions market-led and to what extent are they technology-led?

A. I think some and some. Certainly the way we put our portfolio together I would say that 90 per cent is market-led, so that we try and develop the technologies for a market that we perceive either is there or will be there in the future. There will always be some opportunistic approaches. I am thinking of the 5-HT<sub>3</sub> receptor antagonists which are currently being developed. These are anti-emetics for cancer therapy. There was a SmithKline Beecham observation in terms of the mechanism by which other anti-emetics made their effect and then the research was directed in that way. These situations really are few and far between. For the most part they are market-led and we direct our research towards a product for that particular area, with very specific aims in mind.

1280. And this means that the research that is undertaken then can vary from country to country, according to the market in a particular country.

A. Yes, although we would look at it very much on a worldwide basis, although there are some specific exceptions. Indeed, countries like Italy perhaps or Japan may have specific requirements, and we will direct a particular programme for that particular country.

1281. Could you give us specific examples?

A. I think, for example, of osteoporosis in Italy. Different countries have different views as to the way you treat that, so we have developed a product which sells a lot in Italy but virtually nothing anywhere else, so it is very much directed to that particular market. But for the most part we would

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DR D R WINTERMAN

[Continued]

[Chairman *Contd*]

not choose to do that. We would choose to develop a worldwide product, so that some of the work we were doing on anti-asthmatics or anti-hypertensives we would definitely see as a world product rather than as one targeted at a particular geographical area.

*Lord Gregson*

1282. Would the Italian programme be hormone-based, as it would be anywhere else in the world, or is there some particular quirk in the beliefs of the Italians that there is a special factor in it?

A. I must admit I am not an expert in that particular area. I think, as you say, it is a quirk probably in the way that the medical profession view the treatment of a particular condition.

1283. It might even be a con job.

A. It may be. It is quite evident that different markets require different formulations, so that we would sell probably a lot more injectable product in Germany and a lot more suppositories in France, simply because that is the way that the markets are driven.

*Lord Taylor of Gryfe*

1284. You refer in your memorandum to the DTI's Support for Innovation, which has now been replaced by LINK. You seem to suggest that the LINK scheme, which is on collaborative research, has not been as attractive or as stimulating as the former scheme.

A. No.

1285. Would you care to comment on that?

A. We certainly had at least two very fruitful collaborative projects which were sponsored through the DTI, and I referred to some of the robotic work that we use for microbial manipulations, where I believe we are in the forefront of the technology. When the LINK scheme was introduced this slowed down. It is partly, I think, because it is a new scheme and therefore it is taking some time to get off the ground. The whole concept of the LINK scheme was not a one-to-one collaboration, so that you had to work a lot harder to pull together a number of different companies and universities in order to put those schemes together, and they are therefore taking a long time. We have two now which I can think of, one on asymmetric synthesis and one on biotechnology with UCL, which are just beginning to get off the ground, but we started talking about those projects some two years ago.

1286. But you are in a business in which you have a number of competitors who are carrying out their independent research.

A. That is the other factor.

1287. And you are hoping to produce a Glaxo Zantac situation.

A. Yes.

1288. Would the LINK scheme, which is collaborative research, be particularly attractive to a

company that is seeking to produce a winner, in so far as you are sharing your research with your competitors?

A. Absolutely, and the way those collaborations therefore are directed is towards developing enabling technology rather than the very sharp end of the technology. That is useful, but it is a change of direction.

1289. You are in the market place and have to be competitive.

A. The scheme we are putting together with UCL is in collaboration with Shell, Unilever and ICI. Obviously, certainly with ICI, there are quite distinct overlaps of interest and therefore we would not be interested in a discovery which we alone would wish to exploit.

1290. They are going to share.

A. Absolutely.

*Chairman*

1291. Your paper seemed to imply, did it not, that you were happy about what SERC had done.

A. Yes, indeed.

1292. Particularly through their Biotechnology Directorate.

A. Yes.

1293. But less confident were you about the outcome of the LINK scheme?

A. That is absolutely right. When I wrote this, we were still, I think, at sea with the two particular schemes that I am referring to, both of which have firmed up since, but just because they have firmed up, I am not entirely confident that that is indicative that the scheme is a good one.

1294. Though it was an implication, when you are talking about the "clubs", for instance, that one of the potential values is that it could lead on to a more intimate relationship with one university or one Department, which presumably would serve your purpose better.

A. Absolutely, and that is the way that we tend to look at it. The LINK schemes are very much the development of enabling technology. Then we would start to collaborate, as we do, with what we regard as centres of excellence for particular technologies, so that we currently have projects at a number of universities—Leicester, Sheffield, Kent, Warwick, Glasgow—all in very specific areas.

1295. And those are working, are they?

A. Very well, but they are one to one. We have a preference in many ways for one to one relationships so we can influence direction.

1296. Could you just give us one example?

A. We are currently looking at, with Glasgow University, the metabolic pathway for a growth promoter called Ardacin—it is a fermentation product—and our experience has always been that,



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DR D R WINTERMAN

[Continued]

[Chairman *Contd*]

to manipulate the fermentation process in the most economic way, you really need a fundamental understanding of the biochemistry. That is what certain people at Glasgow University are expert in and they will look at that process and map out the various synthetic pathways to tell us what is going wrong, why we are driving the system to produce the wrong product, and then to start us thinking about how we can either change the screening programme or genetically engineer the system so that we direct it the way that we want to go. So it is part of the overall science of that fermentation process.

*Lord Taylor of Gryfe*

1297. Is this Glasgow or Strathclyde?

A. This is Glasgow.

*Lord Gregson*

1298. One of the previous projects you mentioned is on robotics. As far as I know, and correct me if I am wrong the robotic programme is still the subject of a joint DTI/SERC programme on advanced manufacturing technology, but there is no reason why you should not pursue that as a joint DTI/SERC programme.

A. It is the joint part, I think. You mean just SmithKline Beecham could do that?

1299. No, no, well, individual companies can join that programme for a specific project, can they not?

A. Yes.

1300. These are administered by a SERC committee, which I am chairman of, and as far as I know, that is still in existence.

A. I think we have chosen in the end to go our own way, because we do not wish to develop that technology in conjunction with anybody else, because we see that very much as giving us a competitive advantage.

1301. But you could develop that just with a university through the SERC programme. So why did you not go that way?

A. I was not aware that we could still develop those. Certainly my understanding from the people in the DTI was that that was no longer possible.

1302. As far as I know, that programme is still in existence.

A. I can certainly check that out. If it is possible, then we will.

*Lord Chorley*

1303. Can we go back to Glasgow for a moment, as an example? You look to the universities for the basic research.

A. Yes.

1304. At that stage really what you are doing is just to pay for it, in effect, and to be intimately involved in understanding what is happening.

A. Yes. I think we look at university involvement in two ways, and I am glad you gave me the opportunity to make that point, because I strongly believe that we need to be encouraging the universities to be, if you like, as independent as possible in their research programmes, and if we are not careful, what we will do is to focus them in on the same time-frame as industry, which I do not believe is the way that we should be going. They should be looking at a far longer time-frame, what I would regard as enabling technologies and leave industry to look at the shorter time-frame. The other side of the coin is that, for particular technologies and expertise, we do not have, we would go to a university to look at a project, but that would be very specific. We would do it on a one-to-one basis and that would have the same time-frame as our own. Do you see what I mean? There are two time-frames that I regard as being essential for the universities to work in.

*Lord Kearton*

1305. Can I ask, are you supporting basic research as well?

A. Only through the various LINK and SERC schemes.

1306. A lot of what we have heard is that industry thinks that it is quite reasonable that industry should take part in collaborative research at the commercial end, but that the basic science framework should be the responsibility of the Government. Do you take the same view?

A. I think that is probably our view, yes.

1307. It is your view too?

A. Yes.

1308. Could I ask you, what sort of money do you spend at these four or five universities with whom you have close contacts?

A. In my sphere we spend something like £½ million a year, but on a company-wide basis it must be—I am guessing—£5 million, something like that.

1309. It is still peanuts in the total budget.

A. It is still peanuts, absolutely.

1310. It is one of the criticisms which the Government makes all the time that industry makes nothing like enough contribution to what the universities do.

A. The problem is, and I went through this situation the year before last with a genetic engineering programme that we had with Bristol University, that when you look at what the Government is asking the universities to do in terms of being financially aware, the cost that they are now quoting for a piece of work is the same as the cost that we can do the work for. I have certainly asked my people "Why are we going to let them do it, if we can do it for the same money and we do not have any of the inherent risks of the secrecy of that technology and so on being leaked and we can make sure that we can do it in our time-frame?"

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DR D R WINTERMAN

[Continued]

[Lord Kearton *Contd*]

1311. But on the other hand you do make great play, quite properly so in my view, in your paper about how important it is that the universities should flourish.

A. Absolutely so.

1312. So are you not trying to have it both ways?

A. I think that is probably true, but I really cannot stress enough the importance of the universities and encouraging the universities. I see it as, if not a retrograde, certainly not a very positive step in terms of the financial pressure that they are under, because it is so important in terms not just of an individual project but of the actual turning out of graduates. We are increasingly finding it difficult to get scientists of the right calibre.<sup>1</sup>

*Lord Gregson*

1313. Would it not be true to say that, although you see an altruistic objective as a person, you cannot see yourself spending company money which you have got to justify to do it?

A. I think that is probably true as well.

1314. Is that the basis?

A. Yes.

*Lord Erroll of Hale*

1315. How do you keep in touch with the universities of your choice? It is a moving scenario. Do you have, say, four or five universities with whom you have close links or are you prepared to have a look at any university that may approach you?

A. We would look at any university, but it really is dependent on the people. We had a project, which I referred to earlier, with Bristol. The reader that we were collaborating with took up a Chair at Sheffield, so the project has moved to Sheffield. That was tied up in a way with Bristol University so that everybody was happy that that is what would happen. It is very much directed towards the particular person.

1316. Rather than the university.

A. Rather than the university. We keep up through attending seminars, etc., etc., and for the most part we have developed very good relationships with particular people. For example, UCL is one university where a long time ago—it was when I first joined Beecham—we collaboratively developed immobilised enzyme technology for making the penicillin nucleus. Those links have been

strengthened and strengthened, and UCL would contact us to say “Look, there is a very bright student we would like you to sponsor”, or whatever. We have had that sort of relationship with that particular university.

*Lord Taylor of Gryfe*

1317. Do they come to you or do you go to them?

A. Both.

1318. Your new arrangements with the American company—have you any comment to offer on the comparative relationships between your American partners and your basic British company in collaborative research in the United States?

A. In my particular sphere I believe they are better in the UK, in that in the sphere of influence I have in the US consultants are used merely as that, so if they have a particular problem, they get a consultant in for a day. A small amount of money will be spent on speculative routes to a particular product, but it is not a continuing application.

*Lord Kearton*

1319. Were you with Beecham when Ernst Chain was advising you?

A. Yes.

1320. Because he made a fantastic difference to Beecham. The association between Leslie Lazell and Chain is really what set Beecham on this whole successful course.

A. Yes.

1321. When anyone looks at the very successful developments, such as the development of Zantac, beta-blockers and so forth, it is extraordinary how, in spite of the enormous amount of money, almost billions of pounds, that the pharmaceutical companies spend on research, the really breakthrough ideas come from a handful of people.

A. Yes, unfortunately so.

1322. You say unfortunately so, but what do you do to spot them?

A. I would just like to be one of those people.

1323. What do you do to help locate or spot those people, because they usually start off, if I may say so, not the obvious choices? Chain was different, because he was a Nobel prizewinner, but Black was regarded as a sort of odd-ball in all sorts of places he worked at.

A. Yes, and it is very difficult. Certainly when you look at the people that we have in our R&D organisation, I would regard it as being full of odd-balls.

*Lord Taylor of Gryfe*

1324. It is a good thing.

A. It is absolutely essential, because it is only by having people who do not think along the given lines that you will make that transition.

<sup>1</sup>On reflection I do not think industry is trying to have it both ways. The financing of individual projects is quite rightly born by industry. The question of supporting universities *per se* is another problem relating back to Qs: 1305/6. The vast majority of university research is carried out to further knowledge and as part of an overall education programme. As such it is to the benefit of the country as a whole and of no immediate benefit to an individual industrial concern. It is, therefore, right and proper that these costs are the responsibility of Governments.



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[Continued

*Lord Kearton*

1325. Is Tagamet one of your products?

A. Yes.

1326. I thought it was. How come then that Zantac was able to come along and pinch SmithKline's market in the States?

A. That was before we merged with them. I would like to believe that we would prevent that situation occurring in the future.

Lord Kearton] Best of luck!

*Lord Chorley*

1327. Can we move on to the relationship of R&D with other activities. A number of witnesses, albeit in quite different types of companies, more engineering-based, I suppose, have said to us that really the key to having a good innovative process, leaving aside the company culture as being pre-eminently important, is being able to co-ordinate or even operate in one team, you might say, R&D, production, marketing, new product development. I do not know whether you would include process development in that, which is really what you are here to talk about. A comment by you on that would be interesting, particularly if you could say what differences there were between you—"you" being Beecham—and SKF, which you must have, I would have thought, some interesting observations on, now that you are merged with SKF, on how they did things and the sort of lessons that have been learnt.

A. In fact I think just about all pharmaceutical companies are moving the same way in terms of managing that process, and that is by formation of what are called project teams. We actually have a department, and SmithKline had put this in place on a similar sort of time-frame as Beecham had, which is something like 18 months prior to the merger. It is a very small department, of project managers. Their job is to co-ordinate the various activities, both within R&D and without, for the development of the initial innovation. They co-ordinate the activities of toxicology, clinical trials, manufacturing, marketing, etc., to ensure that the product is being developed in a timely way and is being developed for a particular market so that we are only spending money which is commensurate with the reward that we anticipate we will actually achieve from that product. Somewhere along the line, process development will be involved in this activity, because at some time we would have to look at the economics of producing that product and how it actually fits into the market place—for example, Augmentin, is a combination product, but the key element to that is a compound called clavulanic acid. It was quite obvious at a very early stage that it would be totally uneconomic to produce that compound, unless we found significantly more effective ways of producing it, so process development were involved at that very early stage, to ensure that we were developing the technology—the fermentation and the chemical technology—to

ferment and extract that compound. However, the management of all aspects is through these project teams. Overseeing that we have what is called a development committee, and that is actually chaired by the head of pharmaceuticals, with the head of R&D and marketing and manufacturing representatives all on that committee, to oversee the whole portfolio of products.

1328. That is a sort of investment committee in R&amp;D and development, is it, in effect?

A. In its broadest sense, yes, but really it is trying to ensure that the key issues are raised, discussed and addressed if a particular product is falling behind schedule or if it requires further investment, or if indeed other products are coming in from a licensing operation.

1329. Or abandonment.

A. Yes.

*Lord Erroll of Hale*

1330. Arising out of that, can one accept, therefore, that the club, if I may call it that, of project managers is a joint effort between the two parts of the merged organisation?

A. Yes.

1331. And is the development committee which sits on top of that also an entirely joint affair?

A. Yes. The company now is, as near as you can possibly get it at this stage of a merger, one company. We actually had task forces which looked at all the aspects of the business and restructured what we wanted to do, so that hopefully we got rid of SmithKline and Beecham and emerged with SmithKline Beecham, and that is a totally new management team.

1332. So would you say that one of the results of the merger has been an increased commitment to innovation throughout the merged group?

A. That is absolutely true.

1333. And then on top of all this there is presumably a single main board.

A. Yes.

1334. Who presumably play their part in all this.

A. Yes.

1335. Are you a member of the main board?

A. No.

1336. So you presumably report to them on what is going on?

A. Yes.

1337. And hopefully they agree with you.

A. Hopefully, yes.

1338. But it seems that there are three or four tiers.

A. There are a lot of tiers, yes.

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[Continued]

[Lord Erroll of Hale *Contd*]

1339. Do they filter out a number of mistakes or do they in fact obstruct realisation?

A. I would like to think neither in a sense, because we would, I would hope, have discussed thoroughly enough and analysed thoroughly enough what we are proposing as the experts in the manufacturing process. It would be very rare for us to put up a proposal which was not accepted. In the present climate of course, the debt ratio that we have had, and are now addressing, has undoubtedly meant that we have different internal financial hurdles to overcome, so that an investment that we would have proposed a year ago and had accepted may well not be accepted now. We are looking at more stringent hurdles, but I would regard that as a short-term problem.

*Lord Gregson*

1340. What is your debt ratio?

A. It is above 1:1. We are trying to get it down to 1:1 by the year end.

1341. Is it much above 1:1?

A. It was significantly above 1:1.

Lord Taylor] Because of the acquisition.

1342. I realise that. I am aware of the problem.

A. It was partly because of the debt that SmithKline had and partly because of the money that was put up front to get the shareholders to sign.

*Lord Clitheroe*

1343. Could I ask, from your experience of business worldwide, which is very broad, what sort of regulatory framework or government policy is most effective in stimulating innovation and what countries do you think provide a framework, if there are any, that is better than the UK?

A. Just talking to various people through the company, I think the patent situation was the one that certainly came to people's minds as the No. 1. Hopefully that has been addressed. In fact there was a mistake, was there not, in my earlier submission? It was not a directive at that time; the directive is the better of the two alternatives. I believe now the change will be a directive, and that will lead, I believe, to a better environment, certainly for pharmaceutical companies, where obviously the time taken to develop a new product is an extremely high proportion of the patent life. So I think that is undoubtedly the No. 1 area of legislation and regulation that we would like to see addressed.

1344. Do you see that in the United States, for instance, the framework there is better, forgetting the patent scene, which is slightly different?

A. The framework for patents—

1345. No, the framework for the general ability to enable a company to introduce innovation.

A. It is a difficult question, because you have to take it as a package, and when you look at certain

elements of the package, some you would regard as being more conducive to innovation and some you would regard as being less. They have probably a less restrictive regulatory scene with regard to biotechnology than the UK, certainly less than Germany, where I think Hoechst have publicly said they have built the most expensive biotechnology museum that Germany has seen. So Germany is very bad in that sense. The US is very good. But once you start to look at putting in manufacturing plants, then the restrictions that the US has in terms of the environmental impact are far, far worse than they are in the UK. Undoubtedly there is a case to be made in the UK for tightening somewhat those restrictions, but certainly I would not like to see us go anywhere near the same way as the US where, for the most part, the companies are actively not putting their bulk products into a US environment. There are tax implications as well, which is the other confusing factor.

*Chairman*

1346. Does this amount to saying that one would be advised to do one's biotechnological research in the States but do the manufacturing in this country?

A. I would like to believe that was so.<sup>1</sup>

*Lord Gregson*

1347. Does that not change dramatically when the presently proposed legislation goes on the statute book, and a duty of care is applied to you, but nobody knows yet what the legal implications are of the duty of care?

A. They do not, and I think one of the problems of course, particularly when you talk about a subject such as genetic engineering, is that there is a lot of emotion which is completely outwith the logic of the actual situation.<sup>2</sup>

1348. I was a little curious to find in your memorandum that you mention two Government Departments which are involved, the DTI and the DES but what about the Department of Health, and is it not true that the pharmaceutical industry is well supported for its R&D programme in the price of drugs through the National Health Service? In fact it has been stated by a number of organisations that the UK has the best support for R&D within its drug-pricing policy for the National Health Service of any country in the world. Is that not true?

A. I am not sure. All I know from my current experience is that we are investing in research

<sup>1</sup>My answer referred to manufacturing in this country. I did not mean to imply that one would be advised to do one's biotechnological research only in the States.

<sup>2</sup>It should be noted that there is already a duty of care through legislation such as COSHH and HASAW. Most companies such as SmithKline Beecham operate a genetic engineering safety committee to assess the safety implications of all scales of operation of that particular technology.



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[Continued

[Lord Gregson *Contd*]

facilities in Spain. We are currently evaluating a similar sort of situation in France, where pricing mechanisms are encouraging research.

1349. Pricing in Spain is known to be a free for all, and a lot of the drugs sold in the UK are in fact being imported from Spain. I picked up prescription the other day and the packet was in Spanish, because the chemist happened to believe, and probably rightly so, that the cost of that product in Spain was half the cost that it was in the UK.

A. There are undoubtedly problems with parallel importing.

1350. But is that not part of the package?

A. I think if you look at the situation that pertained a number of years back, the PPRS scheme that was in place, was for the most part a good one. James Diamond who was chairman of our pharmaceutical operation was involved in negotiating the present scheme.

1351. And it is virtually still in place.

A. I think the concern is that that situation is being eroded.

1352. People think it is going to be eroded.

A. I think from our perception, if we do not argue against it being eroded, we have a high expectation that it will be eroded.

1353. But the pharmaceutical industry is well supported by the prescription charge of the National Health Service.

A. It has been in the past. I think there are certain elements of the pressure being put on doctors in terms of generic prescribing and this whole new proposal that is being discussed will undoubtedly encourage people not to prescribe the branded medicines.

1354. Where is the right and wrong?

A. The problem is undoubtedly in terms of our long-term perception of continuing R&D. Of course if other countries are providing an environment, through a pricing mechanism, which encourages R&D to go there, then it would only be right for us to consider them.

1355. But it cannot be Spain, can it, because that is a free for all?

A. I was not involved in that decision or involved in that investment. I can only quote you the fact that we are spending money in Spain currently for a research facility.

1356. But at this point in time the National Health pricing system is in fact conducive to R&D being done by British pharmaceutical companies, and has been for many years.

A. Yes, and we would like it to continue to be so.

1357. That is probably the most fundamental factor in support of the pricing system?

A. Yes, there are tax considerations as well, which have been the case in the past, and again we would like to see that continue.

1358. But when you look at the total thrust of NHS prescribing, it far outweighs any tax advantages.

A. But then the other factor there, particularly with PPRS of course, is that it is undoubtedly biased in UK-based companies. I have no great problem with that, as I work for a UK-based company, but if you were actually going to encourage more research from a non-UK-based company, that is obviously not the way that you would do it.

Lord Chorley

1359. As an auditor, I used to sign PPRS forms on behalf of a company, and they brought in on a formula basis, which I guess is industry-agreed, both their US research and their UK research. It was all an agreed formula. In one sense it was irrelevant where the research was done. What mattered was where the expertise was to do it. So they did some of their research here and they did some of it in America.

Lord Kearton

1360. A lot of the hype of the last decade or so was all on the genetically engineered drugs, one way and another, but the actual proportion of drugs on sale which are really from such sources is still very small. So the gap between this enormous hype that we have had over the last 10 years and the actual fruition of new ideas has been much longer than we were led to expect 10 years ago. What do you think the prospects are for the next 10 or 20 years then?

A. There will undoubtedly be more products in that area, but a lot of it again is what I would regard as enabling technology, in that I think certainly over the last five years genetic engineering has been used to provide target molecules to develop new products rather than providing therapeutic proteins *per se*.

Lord Taylor of Gryfe

1361. In paragraph 5 of your memorandum obviously you are not wildly excited about the City's support. Indeed you start with "Totally negative!". That sounds like a very angry response, and you compare it with the attitude abroad. You say that it is worse in Wall Street and better in Germany and better in Japan. As I recall your activities in Japan, you developed Beecham (Japan) Ltd. Presumably you financed that from Japan. So in view of what you say about the Japanese support for R&D and development, did you finance any R&D in Japan in view of, as you suggest, the attractive financial returns and support or do you do all your research here? You say it is totally negative, but you are in a very speculative area so far as the City is concerned?

A. Absolutely.

1362. You have got to go down to the City and say "Look, we have got to raise £5 million, £10 million or £20 million for this or that. We have no idea how this is going to be achieved, but this is what

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[Continued

[Lord Taylor of Gryfe *Contd*]

we are working on. We may produce a Zantac." Do you not understand a little about the City attitude and City psychology?

A. Whilst I thought it was totally negative, and for the most part I am unrepentant on that, I do not think there was any great expectation that that would ever change. We are a UK-based company and we will be compared with other UK-based companies and Western-based companies. We have talked about how long it takes to develop some of these technologies, but certainly from my point of view I would prefer not just the City but perhaps even the company internally to take a slightly longer-term view of the advantage that technology can give them.

1363. Could you talk a little about your Japanese experience?

A. As you say, we had a Japanese company. In fact the whole Japanese business is currently being reviewed. It is obviously an area of enormous potential growth. When the sales of some of the penicillins that we had were able to feed that growth

we actually did some research, but it was very much directed towards the Japanese market, which has certain peculiarities about it. But we, internally, still regarded that particular work in the same way and expected the same financial criteria out of that as we would for the rest of the corporation. So in that sense we did not say "This is Japan. Therefore, we can have a longer-term horizon." That was never done, and I do not believe any Western-based company would actually do that.

*Chairman*

1364. Are there any final questions? Then thank you very much. We are most grateful to you for coming this afternoon.

A. It was very interesting from my point of view as well.

1365. Good.

A. I wish you well in the rest of your endeavours.  
Chairman] Thank you very much.



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[Continued

### Memorandum by Beaver Engineering Group

I am pleased to respond to the specific questions raised in your letter of 13 March.

Our company is interested in the two main areas of the application of innovation.

Firstly, the application of new techniques in our manufacturing processes and secondly, in the product itself.

1. (a) Many investments in innovation in production facilities require major capital investment. Whilst appreciating the medium to long-term benefit of such investment, many Company Directors and Managers will view with concern the short-term impact on the company's liquidity and profits.  
Preference for the latter will frequently result in non-investment and the generation of progressively more antiquated facilities.
- (b) In all organisations, people are reluctant to accommodate technical change. This is a factor to be considered but not an obstacle once an environment has been created in which innovation is the norm.
- (c) Innovation in product (as opposed to production) requires that the company invests in high cost overhead to create the new and changed product. (Mechanical design, electronic and software design, documentation, marketing, literature, training, tooling, etc.).  
In our company this group of people and costs represents nearly 4 per cent of sales.  
A short-term view, whereby there was no investment in product innovation, would add 4 per cent of sales to the annual profit statement! (and result in collapse in 4-5 years).  
The balance between investment for the future through product innovation and the optimisation of short-term profits usually results in inadequate investment in innovation.  
The solution should be available through *enhanced tax allowances* for investment in product and production innovation.
2. I see no problem in UK companies sourcing or applying imported technology for innovation in manufacturing.  
Today, regretfully, in many product categories "overseas" is the only source!
3. In any manufacturing company product development/design and production engineering should be very closely allied.  
Both disciplines are crucial to the generation and implementation of innovation in manufacturing industry. (The prime skills—allied to marketing with product innovation).
4. Government departments presently make *no* measurable contribution to supporting innovation in manufacturing industry.  
(The contrast to the positive position some 8-10 years back is very marked).
5. See 1. (a) and (c).  
The City seek only short term profit from Industry. No value appears to be placed on investment for growth and long term stability and profit. (Compare with perceived situation in countries such as Japan, Germany and Italy).
6. I am not aware of significant effects from the factors identified.
7. For companies of our size (300 employees) such links are rarely forged and may be viewed as too "long winded" and complex.  
I cannot comment as to how they are viewed by large organisations.
8. EC support for innovation applies to projects with too high a minimum qualification cost; (approx. £500,000). They are lengthy to operate (qualification, application, vetting, etc.), and tend to be co-operational which is not suitable for all needs.  
Our company felt great benefit from S.F.I. grants when available and would support a return to something similar.
9. Good suppliers are a key component of any manufacturing organisation. They can play a major role in innovation of the product and the production process.
10. Cost and control are the only factors—assuming the skills exist.

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[Continued

11. I do not feel qualified to comment other than to say that communication between defence sectors and small companies could be improved.

I hope that these brief notes are helpful and would be happy to expand further on this topic on 20 June (arrangement details to be advised).

### Examination of Witness

MR A P BALDING, Managing Director, Beaver Engineering Group, called in and examined.

*Chairman*

1366. Mr Balding, we are most grateful to you for coming, because a lot of the evidence, inevitably, that we have had has come from large companies and it is a great pleasure for us now to have a small company. I think you have had an indication of the areas we wish to discuss.

(Mr Balding) Yes, that is right.

1367. Is there anything in a general way that you would like to say, adding to your letter, or shall we go straight into the questions?

A. I think it is probably more specific if you lead on.

*Lord Kearton*

1368. Can I ask one to begin with? In the information I have it says: "The Group is one of Britain's leading manufacturers of machine centres and is at the forefront of CNC technology", and then I see that the turnover is £10 million. That would imply that the whole industry in this country is pretty small compared with our rivals overseas.

A. It is, very much so. We have a number of Japanese manufacturers of machining centres who each produce more every month in terms of units than anybody in the UK produces in a year.

1369. It just gives some idea of the mountain you have got to climb.

A. Yes. I think it depends also how you measure my expression "leading". I am not saying we are one of the ones with the biggest turnover. I am saying that in our eyes we regard ourselves as one of the leading manufacturers in terms of investment, development, market position and things of this nature. But there are no world players in the British machine tool industry.

*Lord Taylor of Gryfe*

1370. Not any more.

A. Not any more, sir, no. We used to have the largest machine tool manufacturer in the world in the form of Alfred Herbert, and over the last 10 or 15 years I would guess probably 60 traditional, well-known, long-lived British manufacturers have disappeared, and their places have all been taken primarily by Japanese, Taiwanese and also German manufacturers. It is an industry that has collapsed, it has imploded, and I think it is symptomatic of what is happening to manufacturing generally.

Without a manufacturing industry, you do not need a machine tool industry. We are at the core of it. You need steel and you need machine tools.

*Lord Chorley*

1371. How old is your company?

A. Forty years old next year.

1372. So you have seen all the other people disappear down various plugholes.

A. I would not say that is the case over that period of time. I think the real collapse set in in the late 70s, and probably the last 12 years have been the ones that have seen the major change in terms of business contraction and companies going out of business.

1373. What would you ascribe that to? You have survived and been successful.

A. I would say we are successful. I would not say we are as successful as we ought to be.

1374. But why did the others like Alfred Herbert go out of business?

A. I think that is a very difficult question to answer concisely, because there are lots of reasons why each of those companies are no longer with us. I think probably in the late 70s many of them went because they had antiquated products, poor management, bad investment, poor unionism—all the things we know about that have been wrong in British manufacturing. But I think beyond that point the ones that naturally deserved to die went purely because they could not survive in the competitive world in which we have to operate.

*Chairman*

1375. Turn it round the other way. What was the core of your success? Why did you survive?

A. I think because we were small, in the first instance. We did not have huge overheads to carry. We are a family business, so if our business died, it was my father's business or my business: it was a very personal issue to us, and I think on that basis you fight a lot harder. It is like looking after your own child rather than somebody else's: it is always a little bit different, is it not? And I think we were lucky enough, or perceptive enough if you will, to see that we needed to make technological change in our product, and we started making that in 1978, just before the eighties recession hit us, and, when the eighties recession hit, our company was finding new



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MR A P BALDING

[Continued

[Chairman *Contd*]

customers for its new products, whereas the older companies with traditional products just had nothing to make.

1376. Can you fill that in with a bit of detail? What were the products, what were the technological changes, that brought the success?

A. Sure. Please stop me if there is terminology you are not happy with. Up till about 1978 we were making what were called knee-type machines, which were a fairly old-fashioned form of machine tool, albeit they were computer-controlled. In 1978 we were in the Chicago Exhibition and we saw numerous Japanese machines of what we call a bed-type construction, which was a much more significant, up-to-date, modern construction and these machines were obviously much more attractive to the customer than our knee-type equivalents. Unfortunately, they were available at the same price. None of us now would buy a motor car with a three-speed gearbox and no heater. It is exactly the same analogy. So we came back in 1978 and said, "That's it. We have two choices in our business. We either go out of business or we change what we make and what we offer the customer", and having made that decision, we had to change how we funded it, how we produced it, the factory, the cranes, everything that backed up the product. So we decided to go that way. Having said that, if that question faced us now, I would not go that way, I would sell the business. I would turn it into a parking lot. But in those days I was enthusiastic enough and my father was supportive enough that we went that way, and also in those days the Government, through the Department of Trade and Industry, was very supportive. We were very fortunate to have a number of grants, latterly through the SFI—Support for Innovation schemes—and we had conduits into the DTI, with very helpful and very encouraging people therein. So those were the circumstances that encouraged us to make that change, and it was that change really that took us forward. Everything was built on the product then for the next few years, and we were able to expand, grow and develop overseas markets. Indeed our company now has, it may be of interest to you, four overseas licence agreements in place. Most of the manufacturers in this country buy in their designs. We are actually selling our software and our technology overseas and we have two more under negotiation. So innovation in our product has earned us business of that sort, as well as in selling the finished article.

*Lord Kearton*

1377. What proportion of your sales do you make overseas?

A. Something in the region of 40 per cent of turnover. That was, incidentally, about six years ago, 4 per cent of turnover.

*Lord Taylor of Gryfe*

1378. You had a bad year last year, I see.

A. Yes, we did.

1379. How is it going?

A. We had another loss this year.

1380. But you carry on and you continue in business.

A. Yes, we do. There are a number of reasons for that. We have invested heavily in R&D. We have one product just coming up to market—in fact we ship our first sample in four weeks' time—and that has cost us about £600,000 to £750,000 in development.

1381. You ship it where?

A. To a customer. That is the first one out of the door. For a private company, we now have, over a three and a half to four-year period, £700,000 worth of cash locked up in development and we are about to issue our first invoice on the back of that. This type of investment immediately, or very quickly, finds its way to the bottom line. Apart from the fact that there is not enough profit in machine tool manufacturing anyhow, because of the competitive position, the business decisions we have taken inevitably in themselves bring two or three years of fairly lean profit, or certainly loss. So we feel that we know the reasons why it is there, but even in a good circumstance the profit would not really be satisfactory.

1382. You acknowledged earlier the assistance and encouragement of the DTI. Their support basis has somewhat changed and perhaps your current relationship with the DTI? Are you regarded as a small business enterprise? What are the sources of support?

A. I think I would make three comments to that. First of all, the DTI, as I see it now, is a political backwater and a non-entity and nobody cares about it and "If we have got somebody who does not fit anywhere else, we will bundle him off to the DTI". I think that is a tragedy. From where I stand, and I have a very narrow, blinkered outlook and I only care about manufacturing industry, it should have a real high-flying, high-powered political animal within it who wants to do something. Secondly, there are no grants that are meaningful available to any company of substance. That is my perception. You can get various consultancy support under the enterprise scheme and, in all honesty, from my standpoint for my company they are not helpful. They are only helpful if you are a smaller organisation or you are moving into a radically new area where you have no knowledge at all. There were three comments. I have forgotten the third one. I hope I answered your question.

1383. I was asking about the current support system from the DTI and the small business sector. You have also introduced the consultancy initiative. You would qualify for a 50 per cent consultancy fee, I suppose, in your area.

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MR A P BALDING

[Continued]

[Lord Taylor of Gryfe *Contd*]

A. Yes, but in all honesty, and I hope this does not sound arrogant, there are very few areas of our business activity where we can actually go for outside help. If we are looking at technology in the product or in the manufacturing of the components within the product, it is such a small industry now that we have to look inward for the solutions; we have to generate them ourselves. The only areas where we would look outward would be in areas such as the application of computer technology or information or marketing support, things of this nature, and we have not found that to be substantially of benefit. What we want to see is a renewal of the availability of first-class tax allowances or grant support to enable the major investments that we have to make to bring a new product on stream.

*Lord Chorley*

1384. This is capital investment as opposed to R&D investment.

A. Investments of both type, cash in both areas, but in the product itself.

1385. What you have got to get back is a 100 per cent initial allowance of that type for investment allowance. Is that right?

A. I think there are two questions there. The 100 per cent initial allowance is very, very important to our customer base. Those people to a certain extent are discouraged from investing in cranes, fork-lifts and machine tools because they feel that they cannot hold on to enough generated cash actually to buy, and that has been said to me by many companies, particularly the small ones. As far as we are concerned, our biggest problem right now, in our industry, is that the cash requirement to generate a new product is very significant. For a £10-12 million a year company, to find £750,000 to develop a new product to expand your market and take it forward is a very large sum of money, especially at today's interest rates.

1386. In respect of that, what sort of tax regime are you looking for? You can write off the R&D.

A. You can write it off. That is very helpful, providing your profits are substantial enough to make that worthwhile.

1387. Are you looking for a 120 per cent write-off or something like that?

A. No. I think it would be very helpful if an industry could be encouraged to invest in itself and its future for the nation, and I think it is very important that businesses invest in export marketing, in training, in new product development—

1388. I am sorry, I am talking about the fiscal side. Specifically what sort of fiscal regime are you looking for?

A. I thought you were asking what tax allowances I was asking for.

1389. Yes. It is the same thing.

A. This is what I have been saying to you. I was trying to anyhow.

1390. But you went on to talk about how important it was that companies invest. But what sort of tax regime do you want to encourage you to invest?

A. I thought I was answering your question. Could I start again? We do not understand each other, obviously. I think it is important that a business is encouraged to invest in its product design, its capital equipment, its facilities, its training of people where there is a lack of skills and its export marketing, and we get no encouragement through the tax system to do that whatsoever.

1391. But what sort of tax system do you need to encourage it?

A. We currently have an allowance of 25 per cent against the capital cost of any capital item we invest in and can deduct that from our profits, in terms of corporation tax.

1392. But training or R&D is not a capital item.

A. No, but why can we not have an allowance for expenses in those areas in the same way as we do for capital equipment?

1393. Ah, a subsidy as opposed to a tax?

A. No, a tax allowance. If I spend £150,000 this year in development of capital equipment for resale—new products—why can I not offset 25 per cent of the value of that?

1394. You offset the whole 100 per cent if it is an R&D item.

A. Of course I do, but I only offset it in the sense of diluting my profit. That presupposes you make an adequate profit in the first place.

1395. So what you would like to do is to capitalise it and then write it off to 25 per cent.

A. I am sorry, that is what I am saying to you. You do not understand it very well. You need to be able to retain the cash to carry out these investments, and industry is not able to do it and I am not able to do it. I mentioned earlier, and I will come back to that point because I think it is an important one, that if I was now faced with the same decision that I was faced with in 1978, I would turn left instead of turning right. I would not invest and fight that battle again to keep my company buoyant in a manufacturing environment. Now, none of you know me, but if you did you would know that I have a reputation within the industry as being very heavily committed to the business and to the industry that I am in, and if you hear somebody like me saying this now, I think you should be worried for the attitude of everybody in machine tool manufacturing. I think you can only go to the well so many times and I think inevitably you are going to see more and more collapse in manufacturing industry in this country. I hope I am wrong, but I believe I am right.



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MR A P BALDING

[Continued

*Lord Taylor of Gryfe*

1396. Let me assure you that we are concerned about the collapse of manufacturing industry. I was interested in your financing, with your loss in 1989 of some £639,000 and your anticipated loss this year. Can I ask you, how do you finance the business? Are you working now for the bank or for yourselves? Did you sell some property?

A. Yes, we have recently sold our factory in Norwich for a development and we have rolled those funds into a new factory, but there should be a surplus of about £1 million, which has gone into working capital. I would also add that it is very interesting that a number of friends in the industry queried why the hell we bothered to start again—just sell the factory, let it be a shopping centre and call it a day. But, other than that, yes we are working for the bank. The bank makes more money out of Beaver than Beaver makes in profits.

*Lord Kearton*

1397. Where do you get your staff from? Have you a young staff?

A. I would say the average age of employees is probably around 40, 44. Many of those people have been locally trained, other than qualified engineers who join us from university or college.

1398. You do have a university intake?

A. Yes, but a limited number. We have, relatively speaking, few graduates, but we have a high level of skilled shop floor personnel and most of those are trained, and we have very many people who have been with the company 10, 15 and 20 years.

1399. Where does the initiative come from for all these developments? You yourself? You must have you yourself and one or two people.

A. Actually to conceive the new developments?

1400. Yes.

A. Probably myself and a couple of colleagues.

*Lord Erroll of Hale*

1401. You are listed as a PLC. What about shareholder support? Are they docile or are they pretty pragmatic?

A. No, we have no external money. We are a PLC, but we are a privately held PLC. My father, my mother and myself own the total shareholding of the company. We are what used to be a typical machine tool company—a family-held business. There are not very many of us now.

1402. Kerns was one of them.

A. Used to be, while they were in business.

1403. It was in my constituency when I was an MP, and the Churchill Machine Tool Company and one or two others. It was quite a big centre, but I think they have all gone.

A. Kerns is now part of another company, which recently folded again and became part of another company.

*Lord Kearton*

1404. In view of what you have said, what is your motivation for going on? I think it is extremely valuable to the country that you are, but what is your motivation in going on?

A. There are a number of things. First of all, once you are in a situation you have to fight to defend it and to take it forward, and we are doing everything we can, as we see it, with good business sense, to turn the company back into a profitable position. We have built a lot of equity over the years, we have built a lot of skill, a lot of knowledge, a lot of good products, so we have a lot of very valuable items, even if we have not, for the last two years, put black numbers at the bottom line. We have a hope that the UK will recognise the importance of manufacturing again. The fact that you gentlemen have actually formed this Committee fills me with some encouragement that there is some concern, and I perceive, at political levels, more and more discussion about the importance of manufacturing. I have to hope that, whatever complexion the next Government is, it will certainly put more emphasis back into manufacturing.

*Lord Gregson*

1405. Is it not also true that the value of car parks has depreciated very markedly in the last few years?

A. I certainly hope so. I have not been in the centre of London for some time, but I must admit that, driving from Liverpool Street to here by cab, there is an enormous amount of property development, and I do not see anybody cutting any pieces of metal or plastic in any of those. Something has got to support those all at the end of the day.

*Lord Taylor of Gryfe*

1406. You will take the tube next time, on the Circle Line—15 minutes.

A. I will do that.

1407. May I ask you, who are your customers? Manufacturing industry has seen what has been a great and happy intervention of Japanese capital, particularly in motor cars. Do you get any spin-off from these companies in the purchase of machine tools?

A. No, we have never as a company sold anything to any of the Japanese companies that have invested in the UK. We understand from talking to other people in industry that, generally speaking, they source in Japan. They make the statement that they are looking to source in the UK. Indeed, in the case of one Japanese machine tool builder that has a company in the UK, I understood that initially they were even importing raw castings from Japan, and I cannot see by any stretch of the imagination how that can possibly be economic.

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MR A P BALDING

[Continued

*Lord Kearton*

1408. The Japanese have bought two or three machine tool companies in this country in the last 18 months. Do you think you could be a target for them?

A. I had a visit from a Japanese executive from a trading house about three weeks ago, who ostensibly is here looking for machine tool builders to build Japanese machines, and I think he is visiting anybody who will talk to him. What that means, I do not know. It could mean anything. I do not wish to sell my company to the Japanese. I have spent the last 12 years trying to compete with them and fight them, with all the support and help and everything they have behind them, which we do not have. We play cricket together, but their bat is wider than the stumps. It is a little bit hard to defeat them.

*Chairman*

1409. I think earlier you said that 40 per cent of your product goes abroad.

A. That is right.

1410. Is there a problem in maintaining contact with so many overseas markets?

A. No. It depends how we do it. We have a 10-year association now with a Swiss machine tool builder, who represents a very large slice of that export, and he runs four market territories for us, all the German-speaking territories, so it eliminates that problem. Other than that, we manage to support the markets quite well. We have about 12 active markets and then the others are licensing agreements.

*Lord Erroll of Hale*

1411. How about specialist engineers and technologists within your company? Although you may be a small company by some standards, you must have a high proportion of bright brains and bright people around, including yourself obviously. For example, would you regard yourself as a technically qualified engineer or as a generalist and who actually does the hard work of developing a design into a successful saleable product?

A. As I mentioned to one of your colleagues, in the early days of conceiving a product I am personally quite closely involved, and then we have a couple of other people and certain members of the organisation who will input into the skeleton of that basic specification. From that point forward we have a number of first-class mechanical, electrical and electronics people who will get involved in the detailed design, including obviously software, which is a critical element these days, and, yes, we do have a good team. It is getting hard to retain some of them. There are a lot of industries, particularly service draughting industries, which will pay much higher rates than we are able to. We have lost this year two draughtsmen and I have had to take a business decision that I will not replace them. I cannot afford to compete with the rates they are

being paid and they cannot afford to ignore the opportunities offered to them. I am actually now taking a business decision which decreases the amount of capacity I allocate to R&D rather than holding it, let alone increasing it.

*Lord Clitheroe*

1412. What total number of employees have you got?

A. Three hundred, in round terms.

*Lord Kearton*

1413. When you are developing new products, there is no possibility, I take it, of the customer putting up money up front.

A. Very, very rare, because our products are, generally speaking, general purpose machines. I think Lord Taylor asked where they are sold to. We sell basically across the whole of the metal-cutting spectrum, and it is one of our philosophies that we want a very broad-based product. We do not want to be solely reliant on the military, the aerospace or the motor car business.

1414. But we have had evidence from one company, of which IBM is a major customer, and IBM are putting up 80 per cent of the development costs up front. That makes an enormous difference.

A. Yes. I think that would be the case for us if we had 80 per cent of our business going to one customer, or one type of customer, but that is not the case.

*Lord Taylor of Gryfe*

1415. You have licensing agreements. Do you license your technology? Do you do imported licensing?

A. No. Everything that we manufacture is designed and conceived solely by our company.

1416. Why do you not do that? Does that not save a lot of money in R&D?

A. No. I personally have always been against it, because I believe that if you buy in designs other than to let that design be a small part of your total programme, it is the beginning of the end, because gradually you lose your ability to conceive, your ability to design and develop and to take a product to the market place, and you certainly have to wipe off the ability to carry out outward licensing of your own, which we are doing.

1417. The Japanese did it very successfully with imported technology.

A. The Japanese did it a little differently, did they not? They bought and copied and then sold. They did not actually conduct any licence agreements.



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MR A P BALDING

[Continued]

*Lord Erroll of Hale*

1418. And this you are determined to do—remain a generalist, supplying all markets? I presume you have studied the possibility of, say, concentrating on all the requirements of the international motor car industry and decided against that. Might you be more successful if you had in a sense specialised in regard to the range of your customers and restricted your innovation to the sort of innovations that those particular customers wanted?

A. I do not think we are free to do that, because the type of products that we make require volume, and to get volume you need to sell them to a broad-based public. We also do not want to be exposed to the vagaries of any one industry. I have seen machine tool companies, for instance, who made gear-cutting equipment and when the motor car slowed down in the oil crisis years they went out of business: they had nowhere to go, nobody to run to. Having said that, we are developing gradually now certain of our products away from direct confrontation with the Japanese and Taiwanese equivalents. We are looking for slight variations on a theme, where the customer can identify something unique in our product that makes it worth going for. We are not quite what you said, but it is a move away from direct confrontation.

1419. Some of us watched John Harvey-Jones in his television programmes. I do not know whether you had time or inclination to watch them. Would you, having seen the programmes, have thought it worth while inviting him to give you a going over?

A. I do not know. He is quite a charismatic fellow. I have read the reports on the visit to Morgan, but I did not actually see any of the programmes.

1420. That was a very interesting one.

A. Yes, and I would tend, from what I have read of that, to take his side rather than Morgan's. But we would always welcome anybody's input. We do not know all the answers and we are quite happy to listen and to learn. Having said that, we have a reasonable regard for the way we do things and we feel that we are a reasonably efficient company. It concerns us that, with our level of efficiency, we are not able to be more profitable.

1421. It struck me from what you were saying, if I may say in parenthesis, that you were the exact opposite of Morgan—highly innovative, very well run and open to any suggestions for improvement from within or without.

A. The difference is that they are making good profits and we are not. The difference is, of course, that Morgan are not pressurised by external competition from Japan or Taiwan in particular. We have the misfortune to be in one of the laser beam industries, and if you look at every industry that the Japanese have been active in, we basically are not successful in it in this country now—cameras, radios, hi-fi, motor bikes, even the motor car

industry. Even Austin-Rover now survives courtesy of Honda, from what I can see of it, certainly as far as the product is concerned, and machine tools are now just the same.

*Lord Taylor of Gryfe*

1422. Who are on your board?

A. My father is chairman and I am joint managing director with him, although my father is basically retired now and spends little time in the company, although his heart is still there 100 per cent. We have a works director, who joined us from Lincoln two years ago, we have a sales director, we have a group technical director, chief accountant and two divisional directors, who run specific areas of activity.

1423. So it is all in-house.

A. Certainly.

1424. Has it ever occurred to you as a company, and perhaps a little bit in-house orientated, that new ideas and exposure might come from two or three lively non-executive directors who have experience of the world outside? Full marks to you, I am all in favour of your general motivation and the general wishes of your company to survive in the manufacturing industry—that appeals to this Committee a great deal—but I wondered whether in fact the addition of one or two external directors might even have made you less introspective.

A. It is an interesting thought, perhaps one we should look at.

1425. I am not offering my services, by the way.

A. My bank manager always acts in that fashion when he comes to see me.

*Lord Kearton*

1426. I think we should try to encourage Mr Balding. He has given some fascinating evidence. An earlier Committee of which I was a member, said that the paramount objective for this country should be to get manufacturing industry returned to a key position in the economy. The immediate reaction of the then Chancellor of the Exchequer was to rubbish the report, monumentally, at Mansion House, in his major speech to the City. If you look at Government statements this last year or two, including those by Mr Major and even Mrs Thatcher, you see a complete change of heart. So I would urge you to keep on, because we will get the damn thing changed in due course.

A. I think we have to. I think the long-term scenario for the UK and for our society and our economy is dire unless we can get our manufacturing back. The important thing for everybody to realise is that you do not do it overnight. If we turn the key tomorrow, you are talking 10 years, minimum.

*Chairman*

1427. I hope you have gathered from what has been said to you that we are grateful to you. We thank you for the evidence, because it has been very

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MR A P BALDING

[Continued

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[Chairman *Contd*]

useful, and we are all behind you. We all wish you well and we shall look forward in the future to seeing the business prosper.

A. I am sure it will.

1428. You have the very best wishes, I am sure, of all of us.

A. Thank you.



WEDNESDAY 4 JULY 1990

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Present:

Butterworth, L.	Gregson, L.
Caldecote, V. (Chairman)	Kearton, L.
Erroll of Hale, L.	Whaddon, L.

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**Memorandum by Fisons plc**

1. For the most part lack of innovation per se is not seen by the writer as a major problem in British industry. To the extent that it is, then it is symptomatic of much wider and more deeply seated problems, and it is submitted that a quantum change in the volume of innovation would in isolation achieve very little.

This judgment, however, is much conditioned by the Sub-Committee's definition of innovation as being something that is distinct from invention, and this is interpreted to mean that the Sub-Committee is not concerning itself with Research and Development in its normal sense.

R&D is relatively high cost and in many cases has long lead times, and a number of the points made in the Sub-Committee's briefing paper (as sent to Fisons on 5th February 1990 by the Clerk to the Sub-Committee) would have application to R&D, which undoubtedly is a problem in this country. Short-term City attitudes and a Government which appears to have limited interest in intellectually complex or research based industries are examples.

Innovation as defined, however, clearly has neither the potential expense, nor the lead times associated with R&D, and as such has application to a wide range of commercial situations. Therefore, the type of industry which appears to have been encouraged, and indeed has flourished, under the present Government, such as the retail/boutique boom, the small-scale local enterprise, product assembly as distinct from product design, all have good records of innovation, as do the larger R&D based manufacturing companies.

2. The problems of British manufacturing industry are wider and far more deep-seated than simply a lack of innovation, and indeed it is submitted that little would be achieved by even a major quantum leap in the volume of innovation.

3. There is undoubtedly a major overriding social attitude problem in this country in regard to the work ethic necessary for a nation to be a globally successful country from a manufacturing industry standpoint. This is a problem which pervades all walks of life, from the attitude of the educationalists towards industry and governments of all political persuasions who have a lack of understanding of industry, through to the general concern for social engineering.

This is obvious in governments of all political persuasions, be they from the Left, with social engineering taking the form of a perceived need for improved wealth distribution, or from the Right, where there appears to be more concern for re-establishing historic values (given that they ever existed), and promoting enterprise and initiative.

This latter concern stemmed probably from an era of relatively uncomplicated technology by modern standards, when it was perfectly feasible for innovation and invention to run hand in hand, and when entrepreneurs could genuinely be expected to found large-scale enterprises within relatively short periods of time. Even a cursory glance at successful manufacturing based economies in the world today clearly demonstrates that small-scale enterprise does not in the modern world breed major globally competitive enterprises, and that at a national level only those countries that retain the proprietorial ownership of their base technologies (i.e., retain control of their R&D) produce industries which aggregate to a national success. The integration of small enterprises having close supplier relationship links to large companies is notable, for example, in both the USA and particularly in Japan. West Germany is another example of high added value enterprises based on large-scale R&D based companies.

The combination of social history and lack of political leadership which is commercially orientated are major deterrants to the development of a high wage/high added value economy in this country.

4. Beyond the above overriding consideration, probably the biggest single deterrant to success in this country is the poor calibre of top management.

It is submitted that this is far more important than any other single malaise that is normally associated with British industry. This includes the much-discussed negative role of the trade union movement. Whilst undoubtedly this has existed, and to a large extent still exists as a negative force, nonetheless in more cases than not what is blamed on attitudes and behaviour of trade unions is associated with incompetent top management.

*4 July 1990]**[Continued]*

The UK for the most part is well equipped with competent functional management of both a technical and to a large extent commercial nature, albeit technical functional competence is probably at a higher level than commercial competence, particularly in the marketing field.

What the country sadly lacks is top management which is not functionally biased, but which is competent to develop corporate strategies which have application in the modern world. Strategy in this sense has to be based upon considerations of the industries in which a company operates, and closely allied to this is the ability to be competitive in those industries on whatever scale is required. Companies without a properly thought through, competitively based strategy will not succeed, irrespective of their competence at a functional level.

A strategically driven top management, because of its concern with the business overall, by definition will require operational efficiency at a functional level, and will ensure that the company has the requisite management skills across all appropriate functions, and the top management will not only set the standards for these functions, but also balance them one against the other. Functional strength not forming part of a strategic whole will achieve very little, and there are many examples of failure in British industry, where the company had an over-dominance of a single function with appalling deficiencies in others, e.g., a high degree of engineering skill with no financial skill, a high rate of technical innovation but with no marketing, a dominance of sales management with little marketing or technical back-up—the list is endless and the number of companies one can cite are many in these categories.

5. Against the foregoing background, it is reasonable to claim that high quality, strategically driven top managements ensure, by both encouragement and insistence, that a fully adequate amount of innovation takes place in all functions. Successful companies do innovate, and this is observable again across a wide range of examples.

Good companies breed good managers at all levels, and part of the training of good management is to be ever alert for new opportunities that come from new technology, new techniques etc. Successful companies encourage their managers to seek such innovation and ensure that their on-going training keeps them alert to developments that are relevant to their particular business skills.

In this regard, therefore, the first of the issues highlighted in the Sub-Committee's briefing paper is paramount.

6. On the question of seeking external technology from overseas, clearly the larger manufacturing enterprises tend to be better placed to access overseas technology by virtue of their international spread and the extent to which they may have overseas based operations.

It is that much more difficult for a small company to be aware of, let alone access, overseas technology, and it is one of many arguments as to why small enterprise companies can never form the basis of a nation's economy if it is to be based on manufacturing. It is another example of where small enterprises need links with larger enterprises, which are very often able to channel innovative ideas through to these companies as suppliers (the Japanese experience is worth examining in this regard).

7. The activities of Government departments in regard to promoting and supporting innovation is, in the writer's view, an immaterial issue.

For the most part Government departments lack the experience to understand what innovation is appropriate for a company, or to judge how important any particular innovation may be. This is inevitably so, and it is simply unproductive to spend large amounts of public money seeking out and promoting innovation in a situation where good companies will do this for themselves.

It could be argued that for the small enterprise the Government department's role might be of value, but in practice it is dubious as to whether there is any real return for the investment of public funds that is involved.

8. Whilst the attitude and behaviour of the City are of critical importance to R&D based situations, and the whole debate on short-termism in the City has relevance in this regard, it is extremely doubtful whether City attitudes and behaviour have any relevance to the lower investment and shorter lead times that are involved in innovation, as opposed to invention. Whilst the City, rightly, can be criticised for serving industry badly in many regards, it is unfair to place at its door the responsibility for any perceived lack of innovation.

9. In summary, therefore, it is submitted that lack of innovation per se in the narrow definition of the word is really not a material factor in the performance of British industry, and that there are a number of other factors which are more critical. Social and political behaviour and attitudes towards manufacturing



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[Continued

businesses, the lack of quality of British top management, and the overall discouragement that large-scale R&D based enterprises receive in this country from various quarters compared with their local competitors, are all issues which bear more heavily on poor industrial performance. A sea change in industrial performance will never be achieved without radical change in a number of these more important areas.

Innovation sits low on the list of priorities that require attention. In successful companies innovation is taken for granted and does happen, and is a result rather than a cause of success.

J. S. Kerridge,  
Chairman and Chief Executive  
10 April 1990

#### Examination of Witness

MR J S KERRIDGE, Chairman and Chief Executive, Fisons plc, called in and examined.

##### *Chairman*

1429. Thank you very much for coming and for your memorandum, which is very helpful. Perhaps I may start by saying, in case there is any misunderstanding, that our definition of innovation is the economic and significant application of new knowledge and techniques. I think we ought perhaps to have added that it is also the application of old knowledge in a new way though possibly that can be taken for granted. The memorandum seems to suggest that you felt that that did not include the contribution of research and development. We regard the contribution of research and development as a contribution to innovation, but not the only part of innovation, which spreads much wider into marketing and so forth. The backdrop to our inquiry is the major deficit on overseas trade and manufactured products. There are many reasons, as you point out in the memorandum, of which insufficient investment in innovation to create the competitive products needed is one, and that is the one at which we are looking, although not pretending that it is the only one. Your note clearly indicates that all would be well if only there was good management which appreciated, as you obviously do in your company, the need for innovation. There is perhaps a chicken and egg situation here in that if there is good management there is plenty of innovation. Our problem, however, is that all management is not as good as the best management. We very much value your help on this, Mr Kerridge, because your company under your leadership has been so successful in this field.

(*Mr Kerridge*) My Lord Chairman, thank you for the opportunity. I still believe, on the chicken and egg argument, that the thing actually does genuinely start with management. Highly innovative companies—I can think of a number for which I have worked—can indeed be highly innovative and put enormous emphasis on innovation yet be commercially disastrous because the management is not competent to manage that innovation or to fund that innovation and runs into trouble with its investors so that one can have all the arguments of short termism coming in. If we have a malaise in this country I believe that it is a malaise of top general management. We do not lack the innovators, we do not lack the strong, functional managers be they marketing people or whatever. However, I think we

do lack good strategic management, top management. If you have good top strategic management in my belief they manage these problems because part of their job is to draw all these disparate requirements together and see that they are funded and that the investor is rewarded in a reasonable space of time. I do not personally hold much to all the arguments on short termism. It is, I think, perfectly reasonable for an investor to expect a short term reward for his money, particularly when he has been promised that reward. Delivering what you promise in my experience builds the confidence so that when you do want whatever it may be—patience or money or whatever you are asking for—you are likely to get it. Therefore, I place great importance on management, and I think that innovation is no different from any other function of management.

1430. But supposing you have a company that has not done enough innovation in the past and therefore its products are getting out of date; is there anything we can do to remove the obstacles or to encourage the company to invest more in innovation to get back into the market again?

A. Again it is difficult to generalise, my Lord Chairman, but I would tend to come back and say that if a company gets into that state what that company first needs probably is a change of its top management because then the top management will start to do the things, whatever they may be, that may or may not involve innovation. Fisons, as you have been kind enough to say, my Lord Chairman, has had some success. It is a very good example of that. When the innovation and investment in innovation—I am thinking of research and development because we happen to be fairly research and development intensive—had dropped away to possibly a non-viable level —

1431. You mean in your company?

A. Yes — which a decade ago was most certainly true, in order that one could invest adequate moneys in, in our particular case, research and development, there was a need to change the management and there was a need to gain the confidence of the investors with some short term earnings. One found that by going for short term earnings and managing the business tighter and more effectively there was

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MR J S KERRIDGE

[Continued]

[Chairman Contd]

not in fact a demand for that money to be distributed in dividends. People were perfectly happy to see one invest that money—in our case it happened to be pharmaceuticals, but it could have been anything else—in research and development.

1432. And into longer term projects?

A. Yes. In our case we have changed a lot as a company and we are into different industries from those we were in before. If we take pharmaceuticals as a constant, in 1980 we were investing something under £10 million a year in pharmaceutical research and development; currently we are investing something like £65 million a year in pharmaceutical research and development. Meantime, profits have gone from £3 million to something over £200 million so in a proportionate sense the profits have gone ahead far more than the research and development. Nevertheless, that £10 million even in 1980 money would have been inadequate to discover and develop things. Sixty-five million does not put you well into the international giant league, but it most certainly puts you into the viable league. In that respect we have the result to prove it. That money did not come from asking the City for a holiday on profits or taking a long term view; it really came from generating funds internally by running a tighter management and bringing in new management.

*Lord Kearton*

1433. You have made a very powerful submission, if I may say so. My recollection is that Fisons had a chairman designate who looked at the company and backed out, and you then took it over, is that right?

A. Yes.

1434. He was a very distinguished man, by the way, the chap who did not take it on, with a very distinguished background—Government service and all the rest of it. Why did he take fright and you took it on?

A. The particular gentleman about whom we are talking had a distinguished background but not in industry. At that time I was chief executive designate. Whether it was really terribly sensible for a company in that state to have as its chairman someone who had never worked in industry—

1435. But he did quite well with another, different industry later on?

A. Yes, and may have done better with Fisons.

1436. I doubt that, but it is very interesting that you saw the challenge and accepted it.

A. Yes, I think in that particular case in the circumstances I happened to be already in the company and I perhaps was able to see opportunity as well as the down side and was able to act on that.

Whether anyone with longstanding experience in a leading industrial company would have backed away so quickly I do not know—I think perhaps not.

1437. By definition, the management before you took over—the old management—must have lost its way?

A. Yes, I think that that is true. It lost its way more in the strategic sense of trying to hold on to too many businesses in which the company was patently not competitive, industries that really were lacking in attraction—they were heavily in agriculture. Even if one does not believe that those were unattractive industries self-evidently we were not competitive in them.

1438. You made the correct decision because even now ICI is earning nothing on its huge fertiliser business.

A. That was of course the very business that we vacated. In our instance I think that was the start point of any success that we have had. That is the strategy of saying, first, look at the industries that you are in—are they attractive, in growth terms; profitable for successful participants etc.—and you can model the industries in that way. As to the second requirement, can you be competitive on whatever scale be that global or regional that you need to be. Our strategy in that respect I think has meaning. These are not a lot of idle words that we write, put to the Board and put on a shelf each year, but we require our businesses to be judged on the basis of whether the industry is attractive and, if it is, can we be competitive in it. If the answer in either of those cases is negative we get out or will be prepared to do it, which is really what we have done.

*Lord Erroll of Hale*

1439. You say in paragraph 4 of the memorandum, I notice, that “the biggest single deterrent to success in this country is the poor calibre of top management”. Does that apply to your company—poor top management? Secondly, I see that you sign yourself as both chairman and chief executive. Do you regard yourself as a poor top manager?

A. I do not regard myself as a poor top manager—I may be flattering myself!

1440. Can you successfully combine the role of chairman of the board with that of chief executive? Is there not sometimes a conflict of interest there?

A. No, I do not believe that there is, although there is a lot of current debate on that. I can think of companies where chairman and chief executive are combined where maybe a chairman is very much subservient to a strong chief executive; a chairman who has no industrial experience and owes too much to the chief executive and therefore it is a meaningless division; and I can think of companies where the chairman is so strong that the chief executive is no more than his lapdog. I have worked



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[Continued]

[Lord Erroll of Hale *Contd*]

under all variations of non-executive executive, involved/uninvolved chairmen, and I do not think that there is one solution. It is in my view horses for courses. I can think of many companies that are best run where the chairman and chief executive roles are combined and many companies in which it would be disastrous so to do. I really do think that that debate raised in the City at the moment is tilting at windmills, and yesterday's windmills at that.

*Lord Whaddon*

1441. My Lord Chairman, first, I must declare an interest as consultant to one shareholder in Fisons. I also was fascinated by the thesis. Britain many years ago was a leader in innovative technology so presumably at that time Britain must have been a leader in management skills. We have lost the edge, however. Why do you think we have lost the edge?

A. My Lord Chairman, I do not know that I am qualified to answer that. If I have a personal view, I suspect that in the times of which you are talking in this country it had relatively easy markets by virtue of the Empire and did not need to have the same marketing skills as it patently had in invention and manufacture. Once it lost those markets I think that it became exposed to competition in open markets. I think that a lot of our decline has been the inability to market effectively our inventions, that then feeds on itself and maybe then the invention itself stops or cannot be afforded. We are still a highly innovative country in many respects. If I had a private view—it is no more than that—I believe that it has a lot to do with the demise of Empire and the requirement truly to compete on a genuine international scale. Take our own experience, for example. In 1980 we had virtually no business in America. Today we have nearly 60 per cent of our total group in America. We certainly had no business in the Far East. Today we have companies who have a market leading position in Japan. That would probably make us rather different from many companies. Those sorts of market were not the markets that under Empire we had to compete in because we had a more ready-made market. That may be a wrong thesis, I do not know.

*Lord Gregson*

1442. You show by your 1989 accounts that 77 per cent of your profit was made on 46 per cent of your turnover on pharmaceuticals. Can you give an estimate of how much of that pharmaceutical turnover related to drug supply to the medical profession rather than over-the-counter drugs.

A. I do not have it exactly in my head, my Lord Chairman, but it is predominantly prescription drugs. Something as to 90 per cent or plus is prescription drugs. Over-the-counter drugs as far as we are concerned are a relatively minor part of our business.

1443. Yet in paragraph 7 of the paper you say that the activities of Government departments in regard to promoting and supporting innovation are minor and do not matter very much. Why is the pharmaceutical industry both here and in America screaming like hell about the changes in the pricing structure for ethical drugs and drugs supplied to the health service? We have had pharmaceutical people tell us that if you take the research and development content out of the pricing structure it would ruin the pharmaceutical industry. Is it not a fact that in the pharmaceutical industry the allowance that the Government make in their pricing structure for research and development is absolutely essential for the future well-being of industry?

A. Oh, yes.

1444. Then why do you say that Government have no influence on research and development in the pharmaceutical industry?

A. I am sorry, yes, I think it has an enormous influence in that very limited sense of being our major customer in this country. I think, however, that —

1445. But is that a limited sense? It really is an artificial support for research and development, is it not?

A. Not really, no. The products are by no means priced in this country to make them the most expensive in world terms. If the British consumer is not bearing part of the research and development cost then some other consumer in some other part of the world will be. The main concern about pharmaceutical pricing in this country is twofold. From a company point of view, a narrow viewpoint, if you are British based as opposed to overseas based, a number of foreign countries will base their prices on your domestic price. If you have a price alteration in this country, therefore, it has a disproportionate effect overseas. That is not so if you are American based. From a wider national point of view one has to accept that there is in fact a deterrent built into our pricing structure for pharmaceuticals to manufacture. Although we, for example, will do research and development in this country it certainly does not pay us to export from this country so that the blue collar work coming from the white collar research is done elsewhere. That is why we have major world factories in France, for example. That is why we are building a major factory in Singapore. Thus the benefit to the nation in research and development innovation is certainly very limited by the relationship that we have with the DoH.

1446. You said in effect that we do not price our drugs in this country higher than elsewhere, but the evidence from the Commission is quite different. Drug pricing in Spain is way below equivalent drug pricing in the United Kingdom, and at present a lot

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[Continued]

[Lord Gregson *Contd*]

of chemists of course import their drugs from Spain at half the price for which you are supplying them in the United Kingdom.

A. Quite, drugs prices are low in Spain and drugs prices are low in France. They are very high in Germany, in America and in Japan.

1447. So drug pricing is designed to the market?

A. Oh, yes.

1448. Therefore, there are countries like the United Kingdom where the drug price supports a bigger element of research and development than it does in other countries?

A. Yes, and there are also many other countries that support a much higher proportion.

1449. Since the drug price in the United Kingdom is largely dictated by the National Health Service, which is largely dictated by the Government, does that not imply government support for research and development in the United Kingdom?

A. No, I do not think that —

1450. I do not follow the logic.

A. That would only apply if prices in this country were substantially higher than in other markets and the extent to which they are higher is a reflection of research and development, and that is not the case.

1451. Drug prices in France and in Spain are much lower than they are in this country, are they not?

A. And in other countries they are much higher.

1452. ....

1453. Well, the Commission's figures were that there was not very much increment in Germany except for certain German based patents and drugs. That may be not true.

A. It is not so.

Lord Gregson] Then I have been misled by the Commission. Thank you.

*Chairman*

1454. Do the German Government have the same policy as ours in allowing in the price an element to take account of research and development cost?

A. Not precisely, no. Each country has a rather different mechanism for negotiating price. Germany has only recently been negotiating prices. It was an open market. You will in fact not get common pricing of drugs in the world until you have a common registration. The two in practice go hand in hand. I certainly do not accept that the price of drugs

in this country contains a subsidy that would be R and D based because one could well say that the Americans and Japanese are supporting our R and D on that base even more.

1455. By buying your drugs?

A. Yes, by virtue of the price in the local market.

1456. So the prices you charge are competitive in overseas markets?

A. Oh, yes.

*Lord Gregson*

1457. May I ask one more question on this. The imports of drugs into Germany and Japan are the lowest of any country in the world. The number of drugs that you sell into Japan and America are very low. Therefore, most of their drugs are indigenous with some heavy Swiss drugs, that is, according to the Commission. Does that not mean that they are heavily subsidising their own indigenous research and development in drugs?

A. Not necessarily. In the case of Germany and Japan both respect patents. Therefore, by definition, if you have a patent on a drug you have 100 per cent monopoly in the definition of the market.

1458. Americans are very keen on manufacturing in Japan in order not to have their drugs blocked out, are they not?

A. Ah, yes, but I think the Japanese situation is rather different. They have certain artificial barriers. Japanese manufacturers control —

Lord Gregson] Precisely. Is that not what I have been saying?

*Chairman*

1459. Let us hear the witness, or it is very difficult. Yes, Mr Kerridge?

A. The Japanese position is a slightly different one. The Japanese manufacturers of drugs control the wholesale distribution. One has to accept that in Japan the doctors both prescribe and dispense. Wherever you get doctors prescribing and dispensing you will find a high price market and you will find an over-prescribed market. That is a peculiarity of the Japanese.

*Lord Gregson*

1460. But the Germans prescribe and dispense, do they not?

A. No, not —

1461. Well, that is my experience.

A. — to the extent of the Japanese. They certainly do not control their own wholesale trade.



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[Continued

*Chairman*

1462. Just to try to sum up on this point, you would agree that the price you obtain for your drugs allows you to have adequate margins to invest in further research and development for the future?

A. Oh, yes, certainly, and no one in the industry would sensibly deny that the margins in the industry are high, which they are. We would defend those, I think, on the basis that they reward the high risk implicit in research. It takes seven to ten years to get a discovery on to the market. Therefore, if those margins were to decrease markedly to, say, normal manufacturing margins you would undoubtedly get a deterrent to do further research. As we know, the rewards for success are high; we know equally that success is not easy to obtain.

*Lord Butterworth*

1463. May I come back to the point that you made earlier about the calibre of top management. What action do you think ought to be or can be taken to attract abler people into top management in manufacturing industry?

A. I do not think, my Lord Chairman, that I have anything particularly original to offer. I believe that it genuinely starts off in education. Against the contrasting markets of which I have some experience—America and Japan—there is no doubt that at the root of our education system is either a dislike or distrust of industry generally. Good calibre students at the secondary or tertiary level (particularly at the secondary level) are discouraged still from thinking of industry as a career. That undoubtedly has an effect on good calibre students coming into industry.

There has been a lot going on within the last five years with various bodies being encouraged to get hold of industrialists, to get them into schools, having school-industry links, getting people into governorships of schools and the like. There is, I think, a genuine move now and one of which more industrialists should take heed of people who actually go into the schools and, for that matter, into university and carry the message.

1464. Do you think that Finnieston and others were right in suggesting that one ought probably to look at the pay structure of engineers? A lot has been done, of course.

A. Yes, I think that in part that can help. I think you will never get in industry the almost institutionalised career structure that you can get in other professions simply because of the dependence upon results for success. One of the problems of industry perhaps is that, at the end of the day, unless you are successful you will not get on, and success does not come as a matter of automatic promotion and taking examinations.

1465. I do not want to press you overmuch on this, but is it that young people in school see a better career structure in a joint stock bank than they would see in the car industry or in pharmaceuticals?

A. Well, as regards anyone who saw a career in the car industry . . . !

1466. Very well, let us keep it to pharmaceuticals.

A. Not the most secure, I think! I do not really know, but I think perhaps first it is because the career structure in, say, a bank is more clearly laid out and, indeed, there is a profession on an institutionalised base so that it is easy to see. Also it is a fact that the teachers are not trained in industrial career matters and are not given the opportunity to see industry. I have had a number of teachers. I get them on sabbaticals for whole terms. We bring them into the company, and we actually send them round the world. Some of them have never travelled professionally outside the country, and we pay for them to go and see our company around the world simply in order that they may go back and talk with some authority about the sort of careers that people get in industry. You can then get young people—people of, say, 30 years of age—together with the universities and schools and they will more closely relate to people of 18 than, say, someone of my age. You have got to be prepared to do this and let the children and teachers see what industry is about. I honestly believe that when that happens it is a more attractive career than perhaps some have imagined. I think that over time—it will take time, it is a ten, 15 year process—if we stick at it in this way some message will get through. That is what I hope.

*Lord Whaddon*

1467. Bearing in mind the importance that you place on the quality of the top management what steps do Fisons take to acquire, keep and enhance top management? Is it by very careful selection to begin with, by extra high salaries or headhunting other companies? How do Fisons do this?

A. We tend not to acquire top management but to promote that from within. Therefore, by definition, all top managers start as functional managers with very few exceptions. In that sense we are promoting functional managers into general management. There are steps in a career. The trainee comes in. His first major step is to become a manager. That may be a break point—he may be an extremely good research technician but he will not be a good manager. The next major step, which so many companies ignore, is from functional management to general management. A good functional manager who is very at home with his function and with his experience, does not always make a good general manager. He is not someone who can necessarily pull together the strings of disparate disciplines of which he has no personal experience. Then there is the third layer, which is the problem to which I am referring, corporate management. There is a very great difference between running the general management of a subsidiary, drawing all these strings together, and actually running the totality of a corporation with strategic development. Often one tends to promote, and one has seen people promote,

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[Continued]

[Lord Whaddon *Contd*]

good functional managers into general management and they become over-promoted because they are excellent functional managers but not good general managers. We take what I hope is a lot of trouble therefore both in training and then in trying to test and identify the qualities that one needs for general management, which are not the same as those that are needed in my opinion at least for functional management. In that way it is a selection process. We keep them, I hope, by incentive, motivation and all the other ways in which one keeps people, not just money, because these days most good managers can move for money. You do not immobilise your management by money unless you are going to absurd levels which again have their problems in a different direction.

1468. What would those factors be? I had suspected that this was so. You say, other means of keeping them. What are those other means?

A. Other than material reward, I think—and it sounds trite—job satisfaction, the satisfaction of doing a good job and being associated with success. Indeed, I go further and say that many problems arise when you have managers who are concerned only with reward because they will do all manner of strange things—some of which get in the public domain and some of which do not—chasing material reward. It is about integrity. That is why on the whole question of short termism and incentives for managers I find no problem in giving my managers very good and high bonuses for the short term performance because at the very top I rely on their integrity not to chase short term objectives in order to get this year's bonus if that will sacrifice the future. If you cannot rely on people's integrity as a quality, I think you are dead. That may not be true of, say, an entrepreneur who owns the business and develops it purely for money. That is his privilege; he owns it. In a public corporation, however, I think that there is nothing wrong in requiring your people to have integrity, to show integrity and to take action against someone who you feel chases money because you make money available to him for doing something.

*Lord Gregson*

1469. Does that apply to the chief executive as well?

A. Yes, certainly. That will not be solved by splitting the job and having a weak and inexperienced chairman trying to control a chief executive.

1470. There is this question of paying high bonus for short term results, which is of course now endemic in the United Kingdom as it is in America?

A. Yes, and if you have a chief executive and chairman who chase that to the detriment of the long term, I consider that to be a lack of integrity. That is what you have non-executive directors for.

1471. Is it not the evidence at present that chief executives are chasing the short term to get high bonuses?

A. As a generalisation I think that is not true. In specific instances I think that it is very true. I can certainly think of cases—I can give you my own. I could increase the profits of Fisons very dramatically and very suddenly, and for a number of years, for example, by taking in total terms corporately now £100 million of research and development all written off to profit annually, of which £65 million is pharmaceuticals, and I could cut that dramatically. I doubt it would have any impact in the short term, it would have little in the medium and it would have a disastrous effect long term, but we could boost our corporate profits by a lot. I hope I would not do such a thing but, if I did, that is where you have a strong non-executive content to your board, and a small board, because I do not believe in large boards. Large boards do not control companies. Large boards merely attend meetings. It should be small boards with an equal division of executives and non-executives, the non-executives qualified to comment and judge and be independently minded so to do. They are the best control of companies. When you see problems in companies into which you are looking you have either large boards, who are not capable of controlling anything, or weak non-executive directors, who either cannot or will not control the executive management. In my particular case three times a year I have a formalised meeting with my non-executive directors purely, if you like, to appraise me. I set that up.

Lord Gregson] Are you not the exception?

Chairman] I used to do that in my company.

*Lord Gregson*

1472. You may, but you are the exception.

A. I truly think there is a lot of poor calibre top management, but in this area of general integrity I think that there are more well managed companies than the media would have one believe. There are of course exceptions. Where the exceptions occur they get heavy publicity, and in many cases rightly so. However, I do not think that some of the more highly publicised scandals, whether they appear in the courts or not, are in any way typical.

*Chairman*

1473. Time is getting on, so perhaps we may come back to a point that you made earlier about the risk and the long term nature of some of your products. You were lucky, I think, in the sense that when you came to the company and had to re-orientate its strategy you were able to get some short term cash flow from the products that you already had in being?

A. Yes, my Lord Chairman.

1474. Some companies are not in that fortunate position: they have got down and they have in some way to get back on the track with new products. In



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[Continued]

[Chairman *Contd*]

many industries those products take a long time, as you said, to come to fruition. Do you have any views as to how we could encourage those companies and enable them to get the money that they need to convince the providers of finance that the company is worth supporting although it will be patient money? That seems to be a problem in many parts of British industry.

A. Yes, I think that that is right, my Lord Chairman. If I were placed in a company in that position I think that one would have to make a judgment: is the problem of the company a terminal one. There are situations where I think companies are in a terminal decline and it is now too late to ask for more money even if one believes that success may be there long term. Why should the investor provide money against a bad record where the evidence is not there that the company is going to succeed? I think that there is therefore a judgment to be made, is it terminal? If you judge that it is not terminal the only solution in my view is to form some kind of numerate plan and go to your shareholders, put the plan to them and expose what is then involved, because presumably that may then involve the raising of capital, a rights issue or whatever, and it may involve a pay-out on that money some years away. My experience of the City is that when you do that for the most part you get a good hearing.

1475. And you took positive steps to do that in your earlier days?

A. Oh, surely. In 1980 we were in the Bank of England's critical care unit. That was the extreme. My first exposure to the Bank of England was being told that we were in their critical care unit. I had never even heard of it until then. That was our extreme situation, and there was a need to start there and go out to major institutions and, for that matter, going to well informed press. It does not hurt in that situation if you get the press saying: we think this company is capable of turning round. We had a couple of quite good allies in the press, who were kind enough to back that judgment. It all helped.

*Lord Kearton*

1476. On this topic of spreading management techniques, should you not encourage some of your senior people to go for senior jobs outside and to become bosses in their own right outside? After the training you have given them surely one should be spreading the gospel?

A. Well, I suppose, Yes; but selfishly, No. What we do try to do is to offer these people—and I have a number of them—as potential non-executive directors particularly in the medium and small companies. The problem is that companies, the large or the small, want company chairmen only. I am telephoned six, seven times a year to go on people's boards, I cannot do it and I say, particularly for a medium size company: I have someone who runs a business some times that size who would make an excellent person. But, no, they want the name on the note paper.

1477. May I ask what your original training was?

A. My original training was as a management trainee for Cadbury.

1478. And before that?

A. I have no degree. I had a university scholarship, which for family reasons I was not able to take up—it was a question of step parents who would not fund—and I went into the army.

1479. How did you develop the skills that you evidently have?

A. Largely self-taught—horses for courses and all the rest. I will take credit for doing it that way, but I do not think it is necessarily a very good way.

1480. Most of us who look back on careers find that at specific stages we have been very much indebted to some senior chap who has taken an interest in us. Did that happen to you at all?

A. In my early career—and I did not stop in one job—a number of people influenced me very strongly for good or bad, yes, so in that respect I got a lot of experience relatively quickly by moving jobs.

1481. Have you talked to any of the management schools at all?

A. Yes, I have. I should like to see—not that there is any merit in “single”—us try to get one prime world standard school of management that would challenge a Harvard or an MIT.

1482. Would you be prepared to serve as a visiting professor?

A. I doubt they would want me as a professor, but I should be very happy to give some support to something like that. I should be more than flattered to think I could teach.

*Chairman*

1483. Germany is often held out to us as a place where innovation flourishes because there is plenty of patient money and not the pressure of takeovers, short termism and all the rest of it. From what you have said you believe that good top management is the key to it all. Do we then conclude that in Germany the top management of manufacturing industry is much better than it is here? Do you therefore believe that the other elements which are often put before us are relatively unimportant and it is a question of the top management?

A. No. I think that, like America, their average is possibly higher. I certainly think that, relative to the size of their economy, the number of good managers that they have is higher. However, I believe that the best of British management is every bit equal to the best of German or the best of American.

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[Continued

[Chairman *Contd*]

1484. But German manufacturing industry has been very successful in that they have produced all that the country wants and exports and they have a positive balance of trade. You say that management on the whole is not much better there than ours so what is the reason for their success in manufacturing industry?

A. In comparison with Germany or Japan—again this is only a personal opinion—our tradition in drawing together the elements of driving the economy has tended to regard industrial management, the trade unions and Government as a tripartite body. If you go to Japan or Germany industry is regarded as a single entity and the Government is regarded as a single entity, but then one brings in what we do not have in this country, the financial element. Wherever you see that sort of dynamic success you always see that tripartite: what the Germans and the Japanese, and even the Americans, have singly had is long term low cost money in real and nominal terms reliably provided over long periods of time. In small and medium companies certainly high nominal interest rates—whether we like it or not managements tend to judge projects on nominal, not real, cost of money—and high variable interest rates throw companies off course. If you are big enough you can finance yourself on the world market. One influence on us in the 1980s—perhaps the biggest external influence on Fisons' success—has been the release of exchange control. We could never have achieved what we achieved with exchange controls upon us with our ability to move money round the world and raise money round the world. We were big enough to do it, but medium and small size companies do not have that. I believe the way the banks are close to industry in Germany is a factor, and it certainly is in Japan.

1485. A positive advantageous factor?

A. Yes, I have no doubt about that, although that is not to say that money is not available here, because it is, and freely available. However, as one can see, at the moment a number of companies are going under, particularly the small ones, who have borrowed heavily and then find themselves, not badly managed, but simply unable to service that money.

1486. Due to the high interest rates?

A. High nominal rates.

*Lord Gregson*

1487. There is no doubt that German management is highly qualified. It is almost the exception not to have a doctorate in the chairman or chief executive with two disciplines, usually economics and law or engineering and law. There is very highly qualified management. Is this not a factor?

A. I think it is a factor. Where I would put it in the totality of importance I do not know. In this country there is no doubt that the technical qualification traditionally has not been as highly regarded as, say, the arts student and there is the problem of engineers who never break through the engineering layer whereas in Germany it tends to be the opposite. In Germany one gets far more technicians and those with scientific qualifications reaching the top. That is changing slowly in this country, I think. But if you look at the boards of top British companies, that is, top scientifically driven companies, you will undoubtedly still not find a predominance of scientists.

Chairman]Thank you very much, Mr Kerridge. You have answered all our questions very fully and we are most grateful to you for spending so much time with us.



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[Continued

**Memorandum by Professor S K Battacharyya  
and Dr P T Davies**

The Group is the largest part of the Engineering Department and has a five-star research rating. It was started by Professor S K Bhattacharyya in 1980.

Of its 140 staff, over 110 are supported by external income. This is a very high proportion compared with normal academic departments. Other distinguishing hallmarks are:

- all postgraduate education and research is joint with companies;
- the vast majority of staff are on non-tenured contracts (this is not a recent change, it goes back to the Group's foundation in 1980);
- all staff are on continuous assessment;
- generation of a sizeable financial surplus for the University.

The Group has pioneered modular, part-time, postgraduate education for company staff. It integrates the education with career development. This programme—known as the Integrated Graduate Development Scheme, IGDS—was devised in 1980. It resulted from a critical analysis of the then current postgraduate training and was strongly backed by Sir Geoffrey Allen (then SERC Chairman) and SERC has continued to give support since then, although more than 90 per cent of the total costs are met by industry.

Currently there are over 400 young men and women from over 40 companies on the Masters Degree programme. Each year over 2,500 senior and middle managers are on executive development courses.

The courses are devised, taught and assessed jointly with the Companies. In fact 60 per cent of the course material is taught by them; the MSE Group believes that no University department should expect to retain a monopoly on new knowledge of a wide enough spectrum to satisfy industry's fast-changing needs.

The partnership extends into training for middle managers (Integrated Manager Development Scheme—IMDS) and into the research programme where the Group has a number of joint research centres sponsored by companies:

- Computer Aided Design Centre
- Computer Simulation Centre
- Computer Integrated Manufacturing Facility
- Catalysis and Surfaces Laboratory
- Advanced Technology Centre

Over 50 companies are involved in collaborative research programmes.

**COLLABORATIVE R&D AND TECHNOLOGY TRANSFER—MAIN PARTNERS**

ABB Robotics	John Brown Automation
Allen-Bradley	Kratos
Automatix	Matra Datavision
BASF	McDonnell Douglas Information Systems
Bielermatic	Owens Corning
British Aerospace	Permabond
Caradon Rolinx	Pektron
Carbodies	Postans
Carrs paints	Raychem
Cincinnati Milacron	Redfern Stevens
Clamason Industries	Rolls-Royce
Computervision	Rover Group
Courtaulds	Sandvik
Critical Windows	Shell
Crosby Doors	SNIA
Devlieg	Sterling Mouldings
Digital	Strucom
DSM Resins	Sun Microsystems
Du Pont	Symbolics
Express Foods Group	TWR
HIP	Unilever
Hunting Engineering	Vetrotex
ICAD Engineering Automation	

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[Continued

## TEACHING COMPANIES

Brose  
Dynacast  
GEC/Alasthom  
HDA Forgings  
IMI Refiners

John Brown Automation  
John Marshall Engineering  
Noreros  
Rover Group

## IGDS MEMBERSHIP

FULL  
AT&T Istel  
British Aerospace  
British Airways  
Dunlop-Aviation Division  
Fokker Aircraft  
GKN  
Jaguar Cars  
Leyland DAF  
Lucas Industries  
Noreros  
Plessey  
Raychem  
Rolls-Royce  
Rover Group  
Royal Ordnance  
Schlumberger Industries  
Short Brothers  
SP Tyres  
Thorn EMI  
VSEL  
Westland Helicopters

ASSOCIATE  
Ariston  
BICC Cables  
BP Oil  
British Timken  
Cincinnati Milacron  
Dowty  
Du Pont (UK)  
Dynacast  
Evode  
Ford Motor Company  
Komatsu  
Matrix Churchill  
Nissan  
Potterton  
Rearsby Automotive  
Research Machines  
Ruston Gas Turbines  
Sector Technology  
Simon Engineering  
Star Aluminium  
Surgicraft  
Toyota  
VG Systems  
VNE Nuclear

## IMDS MEMBERSHIP

FULL  
British Aerospace  
Short Bros  
Rover Group  
Rolls-Royce  
Raychem  
JCB Transmissions  
Leyland DAF

ASSOCIATE  
British Airways

## Examination of Witnesses

PROFESSOR S K BHATTACHARYYA, Department of Engineering, and DR P T DAVIES, Director, Advanced Technology Centre, Warwick University, called in and examined.

*Chairman*

1488. We are very grateful to you for coming along. I understand that you want to show us some slides. Perhaps it would be convenient if you could do that at the beginning, and then we can come to questions.

(*Dr Davies*) My Lord Chairman, we have a number of slides to enable us to go through the things that we have been doing at Warwick University, the lessons that we have learnt and finally some thoughts about the possible changes in public funding mechanisms.

(*Professor Bhattacharyya*) My Lord Chairman, I want to present the slides<sup>1</sup> in four different

categories. (*Slide 1*) They are: how we started at Warwick, the key challenges facing industry when I started in 1980, the lessons learnt and the proposed changes to public sector funding from what we have learnt. I started in Warwick in the days of Lord Butterworth in 1980. There was nothing in Warwick at that time, no manufacturing, and engineering was a very small department. (*Slide 2*) I decided as a brief to develop a centre with manufacturing companies—bear in mind this was the Midlands—combining academic excellence with industrial relevance. (*Slide 3*) What was facing the engineering manufacturing industry in 1980 was that the majority of the industries with which I was dealing—the automotive and aerospace centres at that time—were uncompetitive, weak in decision-making, riven with

<sup>1</sup>See pages 255-262.



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industrial unrest and lacking good quality manpower. We could not do very much about the first three, but the last we could do something about. At the same time, in the kind of industry with which I was working then—predominantly the car industry—we had to get involved in the first, the second and the last and the third was left to the Government to handle. (Slide 4) What sustained innovation needs is stability and profitability. That requires managers with forward vision, accountability and the ability to manage technological change, that is, technocrats. It is amazing to say that in 1980 if you looked at the majority of British engineering manufacturing industries in the Midlands and their suppliers you would find that management as such just was not there. The turnover rate of graduates on the manufacturing side of industry was on average 90 per cent. The majority of those who were managers were managing day by day, in other words, they were trying to control chaos. How then could one sustain innovation? It was a very difficult climate. (Slide 5) During the 1980s there was another problem, and even now the problem exists. Since the 1960s—my time in university—there have been so many panaceas: “Bring this in and we will solve industrial problems”. In the 1980s there were all the Japanese nostrums: “If you go to Japan, bring in this, bring in that, and it will solve all our problems”. There was an over-dependence on the consultancy culture. In my role as non-executive technical director of Rover I deal quite often with Honda. I spent some time in Japan in the early 1970s. There are no consultants in Japan. If you are abdicating responsibility in the company and bringing in consultants to solve your problems you will never develop the experience necessary to solve your own problems. A lot of excuses obviously were made based on the financial climate, but I do not think that was a problem, bearing in mind the amount of finance that has been pumped in to some of these companies. There was also too much emphasis on the technology transfer gap and mechanisms as to how to solve the problem. We found that the difference between good companies and the sort of companies with which I was dealing abroad and here was people and the quality of the people making the decisions. If you get that right at least to start off with then one can start thinking about all the other things one should do. We started developing a partnership with two or three companies to carry out an experiment. This was to develop an integrated strategy and to develop technocrats, and then using the technocrats to make the technological and operational innovation. By analysing the decision making processes in these companies I firmly believed that if we could seed some good quality people into these organisations and make them make the changes, at the same time protecting them from the middle management bulge that existed at that time, when the changes could be seen things would happen and accelerate. This required us at the universities to understand how decisions are made in these organisations. We therefore had to combine

working very closely with these organisations from a research point of view and developing the people simultaneously. (Slide 6) Implementation of that strategy required board level commitment. At that time I got that from two of the companies with whom I was starting up, British Leyland at that time and Lucas. We started looking at both. If one just does R and D to remove technological barriers without the staff to implement it, it does not work. If you have good quality staff and they are not given the authority and the accountability, then they do not stay. One had therefore to combine the two. The retraining of British managers became a long term requirement. In the short term one had to inject large quantities of people. (Slide 7) The first priority we had in 1980 was to develop decision makers with accountability and authority with the ability to manage change in a technological business. Quality was more important than quantity. We thought if we had a few good quality people in these organisations to make changes, then others would follow. That was our start. (Slide 8) Undergraduate training is very difficult to change, maybe because it takes a long time and there is too much inertia to change.

Anyway, manufacturing is not a suitable undergraduate discipline. Hence I decided to start off with individuals with a degree or equivalent and with industrial experience. After 20 years of experience I do not believe that we have anything fundamentally wrong with our undergraduate programme. If I look at what happens with our competitors, they use universities to act as a filter. The undergraduate curriculum in Japan is far more theoretical than we have in this country. Making changes in undergraduates therefore will not solve the problem.<sup>1</sup>

(Dr Davies) If I may go back again to the early 1980s, my Lord Chairman, the well established programme for taking the young middle managers in development was a full time MBA. The analysis that Professor Bhattacharyya was talking about is that there was no or little technology in an MBA so that did not fit the bill. Because there was such a strong demand for MBAs it was our strong belief that the providers of them had been able to get away with teaching virtually anything that they wanted. It is not true across the board, but they were repackaging undergraduate material, it was all very general, not specific, and in addition tended to be too prescriptive about things. A new model was created

<sup>1</sup> Note by the witness: The education systems in Germany and Japan are very different, though equally rigorous, yet the national economic performances are the same. Provided that the education is of high quality, the exact nature of it must therefore be less important than the quality of the individuals. It is therefore naive to say that one particular variant of post-school education is the answer.

In the UK we are too prescriptive over how many engineers, and of what type there should be. In practice we need a rigorous education, with wider access than present, and perhaps allowing some individuals to enter the system at age 16. If they were supported by companies, employers would have more chance to influence the system.



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in 1980 therefore. (Slide 9) It was called integrated graduate development. It was started with pump priming money from the SERC. It was invented as a concept by Professor Bhattacharyya and Sir Geoffrey Allen, who was then chairman of the SERC, and he backed it. It is very simple in concept. It is a modular master's degree. People stay in their parent companies and come out part time to take modules with us in the university. More than ever attempted than before, I think, the ownership was given to the companies who were going to send their staff on the programme. Every aspect of the programme was defined in conjunction with the companies. I will perhaps come back to that point, my Lord Chairman.

(Professor Bhattacharyya) The psychological point is that because within the first 12 months the majority of the graduates left the manufacturing sector, if we can trap them initially for two to three years, making sure that while they are doing the master's programme they are able to make the changes, and if I can bring them together, at least the first battle is won. We decided to do that. We said: we are going to protect these guys for the first two years and help them manage the organisation and make sure that, if anybody leaves, the managers are going to be brought in to explain why they left. It is that initial closeness between the university and the companies concerned that made this programme so valuable. Many people nowadays are doing a modular programme, but bear in mind that in the 1980s in engineering companies to force them to have a forward commitment of three to five years was a big problem.

(Dr Davies) I come to the statistics. (Slide 10) We have about 40 companies sending staff on the programme. There are over 400 participants at present. These would typically be aged about 28 to 30, with degrees and industrial experience. With that number of companies there will be people on a module from perhaps 15 different companies so there is a lot of cross-fertilisation between people in different engineering manufacturing sectors.

1489. IGDS is your course?

(Dr Davies) Yes, the integrated graduate development scheme.

(Professor Bhattacharyya) It integrates the career development of the individual in the company with vocational training.

1490. How many years does it extend over?

(Professor Bhattacharyya) It takes about two and a half years. We could do it in a year, but we wanted to make sure that whatever they learn in a particular week they can go and immediately apply to the company so that the company acts as a test bed.

Lord Kearton

1491. How many separate courses does that cover?

(Professor Bhattacharyya) About 60 modules.

1492. That must have taken an enormous amount of initial organisation?

(Professor Bhattacharyya) Yes, but what is amazing is that in the early 1980s there was a willingness on the part of industry to change. Because the Government had created an environment for that to happen, there was a lot of interaction with the company. Normally what happens is that the university decides it wants a package; then it sells it to a company or to postgraduate students and that is it. Here, however, everything—examination, tutorials, case studies, material, even presentation hour by hour—is jointly decided by the companies.

(Dr Davies) Just one measure of that, my Lord Chairman, is that over 50 per cent of the material on the programme is taught by people from the companies or other specialist providers. We in the university teach less than half that. We think that that is a model of the way these things have to go in the future. No university department can expect at any one time to own all the intellectual ability that is necessary to teach a fast moving industry.

Lord Gregson

1493. Is it taught on the campus?

(Professor Bhattacharyya) Yes, it is taught on the campus. The terms of my coming in there were that I wanted a 100-bedroomed facility, executive, which we have done.

1494. Stamford do it in companies, which seems easier?

(Dr Davies) But then you are talking to that company culture only.

1495. No, it is not single companies.

(Professor Bhattacharyya) I know what they do at Stamford and also what they have recently started at MIT with Boeing and others.

1496. It is not just single companies.

(Professor Bhattacharyya) But, you see, the difference here is that 50 to 60 per cent of the material is taught by specialists who have nothing to do with the university. We vet their academic ability. All the individual modules that they teach are assessed by the company and the university together.

Lord Kearton

1497. How do you develop their teaching skills?

(Professor Bhattacharyya) I must admit that it was very difficult in the early stages. Now even senior



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company directors go through a programme that we have on communication skills. It is also crucial that every Friday, when the course finishes, every lecturer and all material is assessed by the participants. Bear in mind that we do not take anyone below two ones—they are normally first or two ones; only in exceptional cases do we take others. They are normally very bright people. You cannot just go in and talk to them and come out. The other point concerns the discipline that is required. In a normal year's course they are there all the time and there is a great deal of discipline. The great advantage that they have is that it is like a club. They are all together—British Aerospace, Rover, Vickers, Jaguar.

Lord Gregson

1498. You did say degree or equivalent. If they are all firsts or two ones you have no equivalents?

(*Professor Bhattacharyya*) Yes, we have.

1499. What are they?

(*Professor Bhattacharyya*) In exceptional cases we will take below two ones.

1500. Non-graduate.

(*Professor Bhattacharyya*) No, non-graduates we will not take.

1501. That is what you said.

(*Professor Bhattacharyya*) No, I will come to that. There is a programme that is a non-master's programme. It is a diploma programme, but it comes under the integrated graduate development scheme or has the same mechanism, but there is a hurdle in between. The hurdle is that they must pass certain subjects, and then they are allowed to register for a master's programme.

(*Dr Davies*) (*Slide 11*) The purpose here is to make the point that it is rooted in manufacturing technology, design systems technology, information technology and so on, but with a large overlap with what the business schools may teach—corporate finance, risk analysis and that sort of thing. It is possible therefore for people—and typically they will pick 14 modules out of the 50—to match the modules against their company function, but always well footed in technology. That is the one thing from which they cannot escape.

Lord Kearton

1502. Professor Bhattacharyya mentioned 100 bedrooms. You built a special hostel for them?

(*Professor Bhattacharyya*) Oh, yes, everything is special for them. If I am going to be working in an organisation and come to university for short, very intensive bursts I do not expect them to come to a normal university campus.

1503. Who financed the building?

(*Professor Bhattacharyya*) Everything is self-financed. I have not been to the Government for anything.

(*Dr Davies*) We have 120 bedrooms now and we have just got agreement to go ahead with another building.

Chairman

1504. I think we should perhaps finish the presentation because some of our questions may then have been covered.

(*Dr Davies*) (*Slide 12*) The triangle here represents the tiers of management within the company, junior management, middle management and top level. We have been talking about people typically aged 30 going on the integrated graduate development scheme. We can talk about other schemes if you like, but this is to make the point that we have a separate programme called integrated manager development scheme for middle managers. It does not give them a master's programme, it is not as time consuming and the modules are a half week or whatever. We talk about spreading the gospel so the same message is going in at all levels. There is a set of awareness courses for senior managers which is tailored to what the company wants in duration, content and so on.

(*Professor Bhattacharyya*) The bespoke one is quite often done before they do their annual corporate plan. They come over and have a brainstorming session at the university.

(*Dr Davies*) The other half of what we are talking about, i.e. preparing the people to be competent technology managers, is of course developing the technology. What we have tried to do in the group—one of about 140 people now—is to be multidisciplinary. (*Slide 13*) I should perhaps apologise for this catchphrase, "from management to molecules". It represents the fact that within the group we have economists, management accountants, people building computer simulation models of production, the computer integrated manufacturing facility, metallurgists, ceramics people, plastics people to quite basic chemists—we have many millions of pounds-worth of surface analysis equivalent. In the one group the idea is that when we are looking at some kind of new technology solution we are not having difficulty trying to put together separate packets of information. The group has the capability to take it nearer to a solution that the manufacturing company will recognise. If we were dealing with pharmaceutical companies with large corporate research laboratories and plenty of PhDs on the staff they have the ability to pick up any nugget of new knowledge we would generalise and use it very well. Dealing with engineering and manufacturing industries it is by and large a different scene. The onus is on us to get nearer that which is recognisable as a solution, hence the multidisciplinary approach. Where do we do the research? (*Slide 14*) We have within the group what we call



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technology transfer centres. They are all collaborative with companies. They provide two functions. They support our research and development programme and they provide facilities on which we can demonstrate to the people on the manager development programmes and all the rest of it. Always therefore we are doing two things together. The vast majority of equipment and facilities are provided by the companies. We also take company staff seconded into the programme. I am responsible for something called the advanced technology centre. Fifty per cent of all our staff are seconded in from companies to work with us. (Slide 15) As to the main centres about which I am talking, in collaborative research we work with over 40 companies in total. I will leave with the Committee, my Lord Chairman, a list of all the companies in the research programmes and in the people development programmes. The main centres are the advanced technology centre with Rover and focussed on automotive research, and Rolls-Royce have an advanced ceramics centre. Then there is CAD/CAM—but perhaps I will not go through them now, my Lord Chairman, but if you have questions later on we will be happy to deal with them. As well as our own centres we make good use also of the national teaching company programme, which in fact is the other side of the coin. That puts staff employed by us out into the collaborating companies. Warwick, as you may know, has a thriving science park and we have close links with many of the companies there. In fact, the majority of the companies came to start the science park because of the manufacturing group. That is the style of the joint research. (Slide 16) This summarises what we have been saying so far. There are the two avenues of developing the technocrats and developing the technology. IGDS and manager development are our main tools to develop people with collaborative research done through the centres. (Slide 17) To illustrate the point about industrial income, we are 140 staff plus the industrial secondees. About £900,000—10 per cent—of our generated turnover is UFC money, which is primarily for undergraduate teaching. Ninety per cent of our income comes from earnings for research and development therefore and for postgraduate training. That is reflected in the fact that the vast majority—probably well over 110—of the 140 staff are dependent for their employment on the external income. Therefore, the ratio of fixed term appointees, as it were, to tenured staff is almost diametrically opposite to the usual academic department. On the master's programme we have about 500 people in total because we have 400 on part time and the balance on full time master's; and 2,500 people on IMDS and other short courses. That gives the statistics, my Lord Chairman. (Slide 18) If we look back now on nine years of activity what are some of the breakthroughs that the manufacturing group has achieved? First, we have united management education with technology. We are proud of the fact that what traditionally happens in an MBA or business school programme has

happened in an engineering department. We have the track record now of seeing the graduates of our programme go off into companies and rise to senior management positions themselves. We can see the success of the programme in the generation of technocrats. The multidisciplinary research is working. The chemists support the information technologists where the programme demands it, and so on. The whole business of overcoming the so-called technology transfer gap by doing the work of research in partnership with seconded staff has worked very well. That has been the major pleasure for us. (Slide 19) What have been the features of the successful growth of the activity? The key seems to have been that always our priority has been settled in conjunction with companies. The university has provided an environment for quick decision making. Warwick is not beset with committees that take ages to process. Even if the answer to a request is no, we have been able to get it quickly and go on to something else. Clear accountability means that if we are dominated by industrial funding there is somebody at the end of it who actually wants the results and is watching us very closely for that.

Our programme managers are therefore accountable. There are no committees between them and the customer. The bulk of the funding and equipment from companies speaks for itself and shows the degree of company commitment. Even more so there is the fact that companies have seconded in staff, which is harder than providing money and a true measure of their commitment. (Slide 20) We then stand back and say, let us look at the public funding, SERC, DTI and so on, and ask how that measures up against the key criteria. I am now addressing the public funding of applied research and what we are calling near vocational education.

We are talking about people being developed to do their job in the company. The good news is that there is a trend towards joint funding between DTI and SERC so that the industrial side is being looked at in conjunction with the academic side. More and more schemes such as LINK are asking for significant industrial contribution. We very much like the move towards directorates where there is a visible director or co-ordinator who is responsible for formulating the programme. In many ways therefore we think that DTI and SERC over the years with teaching companies and so on have broken new ground in fact in the world. The teaching companies scheme was the first of its kind as far as we can see internationally. (Slide 21) However, my Lord Chairman, there are some features that are not so good. If we are dealing with applied research which is coming up to the boundary of the sort of thing that a company would do itself, peer review is fuzzy—who is responsible for the decision, who is responsible for monitoring it and all the rest of it—very bureaucratic and lacks accountability. When you have only part time industrial committee members, some of whom are first class, as I am sure your Lordships know, the papers are often out too late and they are read on the



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train before the committee meeting so that the fact that a committee member comes from a company does not itself generate industrial commitment. With regard to company contributions, we have to say that we have been part of this system in the university so we have seen it at first hand. Companies will count management time and soft money things as their contribution to projects sometimes. The real measure is hard cash or equipment, something to which they are answerable within the company. The public funding system generally gives a lot of effort to selecting from competing proposals at the start of the process. What we should be interested in is the set of results at the end of the process. When we are dealing with companies the decision to fund is often a very quick one at the start, but—golly!—at the end of the process they want to see what they have got out of it. Our credibility later on depends on it. When the LINK scheme is being run, for example, the academic money comes from SERC under its mechanism, the company money comes from DTI under its mechanism, so there are different mechanisms, different time scales of working and things are not aligned. As your Lordships will know, LINK collectively is having problems spending its money at the moment. The system is not working smoothly enough. Looking back on some of these programmes, therefore, our diagnosis is that, although they may have led to invention, not enough of that invention is showing up in economic benefit or “innovation” as your Lordships have taken the definition. What could be done about it? (*Slide 22*) This last slide shows some proposals for changes to the system. They are not radical proposals. We are trying to pick up on the many things that DTI and SERC have been doing in the past and extrapolate them forward in the light of our experience. The first thing we do, my Lord Chairman, is to take the directorate approach but say: the directorate not only formulates a programme but is responsible for funding it and accountable for the results. There is therefore no peer review. The funding goes to the directorate and it decides, and has to stand by that decision. The directorate may well take advice from many wise people in academia and industry, but it is responsible. Why not have the fusion of public and private money reflected in the fact that the directorate would itself be staffed with industrial secondees, academics and whatever, not just public servants. A very clear rule says that 50 per cent of every resource demand in our education institute is met by the companies so it is real money, real equipment, actually going into the university project. To respond to the point about flexibility and fast response, public funding presumably would come through DTI and SERC, but not second-guessed; once the budget is allocated to the directorate it is an agency for both DTI and SERC.

Lord Kearton

1505. Are you putting these proposals to the DTI now?

(*Dr Davies*) Yes, we have put them to the SERC and we have explained them to the DTI.

1506. And SERC has blessed them?

(*Dr Davies*) I think that SERC is in the process of thinking about them.

1507. And then after that you go to the DTI?

(*Dr Davies*) Yes. We have also explained them for DTI officials, but the discussion is on at the moment.

(*Professor Bhattacharyya*) It is very difficult to make decisions about this.

(*Dr Davies*) My Lord Chairman, the last slide was about improvements to the funding of applied research and near vocational education, master's programmes and so on, and we are saying, wherever possible, combine the R and D work in universities with post experience education the way that we have done it at Warwick. Although I am responsible for a research programme in the advanced technology centre it makes big use of the graduate development scheme for technology transfer because we lecture on the programme and we use our work as case studies for the short courses. It is a mechanism for dissemination. Not only does it benefit the R and D programme, but it is a general defence of investment in training, I suppose: if you train good quality people you benefit from their judgments thereafter, whatever part of the business they are in. The cost of their training in the long term will be very much less than the cost of misplaced R and D or R and D that leads to invention but no innovation. In conclusion, we have explained the analysis that Professor Bhattacharyya went through in 1980 when he started the manufacturing group at Warwick, the schemes that he tried to put into place to work with manufacturing companies and what we think we have learnt—and we have made mistakes as well as getting some things right—after ten years; and in our judgment those lessons would apply to public funding. Thank you, my Lord Chairman.

Chairman

1508. Thank you, Dr Davies. It would be very helpful if you could let us have a copy of the slides.

(*Dr Davies*) Certainly.

1509. What exactly do you mean by “directorate”—part of the DTI which has money allocated to it?

(*Dr Davies*) Yes, joint with DTI and SERC.

(*Professor Bhattacharyya*) The trouble — and everything is being written down and I cannot speak off the record, my Lord Chairman.

1510. If you want to say something off the record, you can do so, Professor Bhattacharyya.

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(*Professor Bhattacharyya*) That might be necessary later.

*Lord Gregson*

1511. My Lord Chairman, I might declare an interest since I was the founder chairman of ACME and still have responsibilities to DTI and SERC for combined funding programmes with the Treasury so you have to take that into account. Perhaps I should leave the room . . .

(*Dr Davies*) ACME is one of the better activities.

1512. I was going to explain that none of what you said there fits ACME.

(*Dr Davies*) Exactly, because there you have peer review but dominated by the directorate.

1513. May I just put the record straight as far as this is concerned because it seems important to do so. The DTI money does not require a peer review?

(*Professor Bhattacharyya*) Yes.

1514. So there is no peer review accountability as far as DTI money is concerned; it is totally under the control of the directorate. No part of the DTI is now subject to peer review?

(*Professor Bhattacharyya*) Yes.

1515. The fundamental problem that you are mentioning at the present time is that on applied research it is government policy not to fund near market research of any kind, so that is policy. Are you criticising the DTI, SERC or the Government?

(*Professor Bhattacharyya*) No, nobody, because—let us face it—if SERC are doing, what is it, sixty million pounds worth of research in engineering, then —

1516. Let me correct you there. SERC are not concerned with pure science; they are concerned also with applied science.

(*Professor Bhattacharyya*) Fine. But if they —

1517. Many of their programmes are applied, but they cannot go anywhere near near market research by government definition.

(*Professor Bhattacharyya*) To be perfectly frank with you—you were chairman of ACME—ACME is all near market. If I was vetting ACME I should have said it was all near market.

1518. I am telling you what the policy is; I am not saying what ACME did—that is quite a different thing.

(*Professor Bhattacharyya*) The Government may say - and I do not know what the Government does

— that is so because they do not have enough returns. If, for example, you are doing near market work and then there is no accountability and no criteria from that viewpoint, the Government is right to say, why should we fund near market research. However, I think that if there were mechanisms by which a lot of things could happen and industry took a real share in the research, that is, a hard cash share in the research, I am pretty sure that the Government could be convinced of the fact that work could be done in a different way. But then there is another problem we have. Let us take DTI. DTI always say, 50 per cent industrial funding, but when you analyse that 50 per cent industrial funding it is probably less than 10 per cent cash.

*Lord Gregson*] That is not my experience.

*Chairman*] Let us hear the witness.

*Lord Gregson*] All right.

*Chairman*

1519. You say 10 per cent is the contribution of industry in solid cash?

(*Professor Bhattacharyya*) In our case it is 90 per cent odd and they are quite prepared to pay. If you go to Stamford research institute there are enormous amounts of R and D that take place with company funding. If you go to MIT there is a lot of research that takes place with company money. However, if the company says, we will produce up to 50 per cent value in cash terms—and, you see, they do not really do that.

1520. So it is only 10 per cent in cash terms?

(*Professor Bhattacharyya*) On an average.

1521. Is that right?

(*Professor Bhattacharyya*) Yes, but it is not enough.

1522. You say it is not enough?

(*Professor Bhattacharyya*) No, it is not enough! If you are the chairman of a company and you are producing ten thousands pounds worth of funding for a major research, you are not going to be that much interested.

*Lord Gregson*

1523. The only problem here is that the DTI criterion is a maximum of 30 per cent funding, not 50 per cent funding. That went out in 1986. It is now 30 per cent funding as a maximum.

(*Dr Davies*) Of the total programme, HEI plus industry.

1524. SERC funding is on a different basis because fundamentally that is applied to the academic part of the operation. All the ACME programme had an industrial content, some of



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which is provided equipment, and I accept that. If it was not provided they would have to pay for it, because they would have to pay for it anyway. If you do the accounting as it has been done by the National Audit Office, properly audited, the cash content is certainly equivalent to 50 per cent on SERC funding and it is equivalent to 70 per cent on DTI funding. If you are saying that that is not true, then we had better go back to the Auditor General and ask him what the hell he has been doing.

(*Dr Davies*) We are not talking about ACME. Though we doubt that ACME gets 50% cash funding from industry.

Lord Kearton

1525. Will someone remind me what ACME is?

(*Professor Bhattacharyya*) The application of computers to manufacturing and engineering.

(*Dr Davies*) We are not advocating near market research as such. What we are saying is this. In the spectrum of things that SERC supports, part of the spectrum is pure and part of the spectrum overlaps with the sort of things that companies themselves are funding. It does not have to be near market. Companies extend themselves into strategic research. We are talking therefore about that research which gets close to what companies themselves do. That is the area of overlap in which we are interested.

Lord Gregson] By the government definition that is near market.

Chairman

1526. Can you tell us a little about what changes you would like to see?

(*Dr Davies*) Perhaps I can give an example of LINK, my Lord Chairman. There are LINK programmes at the moment. The application for a collaborative project is really a double banked one. The companies in effect are applying to DTI, and the university partner is applying to SERC. SERC rules apply to what the university partner gets. The fusion of the companies and the university having been obtained first, in our view it would be much better to go along and make one submission to one body, that body decides it and it has one mechanism for giving money to the consortium.

1527. And that would be the directorate?

(*Dr Davies*) That would be the directorate. Further, we would say that if companies are willing to put money into this area we would like to press forward and say that the directorate should have seconded industrial staff as part of its membership. That seems to be a wholly healthy development and again would be a new fusion of public and private funding in the United Kingdom.

Lord Gregson

1528. What you are really saying is that LINK should be run the same way as ACME is run?

(*Dr Davies*) I think more on those lines.

1529. That is exactly what ACME does.

(*Professor Bhattacharyya*) But without the peer review.

1530. The peer review in ACME is very minimal because DTI money does not require a peer review.

(*Professor Bhattacharyya*) But formally SERC —

1531. Well, let me just explain the problem again here. It is impossible legally for SERC to give money without peer review because that is primary legislation. You are suggesting to change that would require primary legislation to alter all the research councils?

(*Professor Bhattacharyya*) All? You could take it out, then —

Lord Gregson] No, you cannot take it out!

Chairman

1532. Let us hear what the witnesses are proposing.

(*Professor Bhattacharyya*) What we are proposing is that if you have a directorate outside the SERC and DTI mechanism —

Lord Gregson

1533. Separately funded?

(*Professor Bhattacharyya*) Yes, an agency where the money can come from the DES and come from the DTI and from industry and other bodies. There are numerous agencies in SERC even: there is marine technology. If we get into details I think we are going to get into all sorts of trouble. If you have a mechanism whereby there are three parties, Government, higher education and industry together, you will not have all the hang ups of peer review on the one hand and the bureaucracy of government on the other hand, and whatever money is allocated will be spent much more effectively. That is number one. Number two is this. The multiplier effect of one pound coming from the Government can attract large sums of funding from the private sector. We do that, and we only started ten years ago.

Lord Kearton

1534. You said that you had a turnover of £9 million, of which 10 per cent came from the UFC?

(*Professor Bhattacharyya*) Yes.

1535. Where does the other 90 per cent come from?

(*Dr Davies*) It is largely coming from industry.

1536. It seems to me that you are doing all right anyway!

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[Continued]

[Lord Kearton Contd]

*(Professor Bhattacharyya)* We are doing all right.*(Dr Davies)* We have no personal axe to grind!*Lord Gregson*

1537. What about ACME money, CASE money, teaching company money, does that not come to you?

*(Dr Davies)* Yes, the 90 per cent is —

1538. That is government money? It is not part of the 10 per cent?

*(Professor Bhattacharyya)* No, we do not get —

Chairman] We cannot possibly get this reported if we do not ask questions and allow the witnesses to answer.

*Lord Gregson*

1539. The 10 per cent is what?

*(Dr Davies)* The 10 per cent is UFC money. The 90 per cent is predominantly industry money, but in there will also be contributions to teaching company and IGDS.

1540. And CASE?

*(Dr Davies)* We do not use CASE.

1541. Why not use CASE?

*(Professor Bhattacharyya)* We do not use CASE, we do not use LINK.*Lord Kearton*

1542. Perhaps I may ask about another point. I am struck by the fact that you have 400 graduates through this course, all of whom are firsts or two ones?

*(Professor Bhattacharyya)* All employed by industry.

1543. I am amazed that there are so many of that quality in Midlands industry.

*(Professor Bhattacharyya)* They are not just in the Midlands. We have companies up in the north and throughout the United Kingdom. For example, there is Rolls-Royce, who send altogether about 60 people.

1544. That explains it. I used to live in the Midlands, and I must say that ones and two ones were pretty scarce.

*(Professor Bhattacharyya)* I agree with you, and that is the problem.*Chairman*

1545. Perhaps we may go back to your masters degree and the description of what you do there. You are saying, I think, that the other schools, such

as Manchester and London, are too academic and too remote from technology and manufacturing to be of value in the field that you are tackling, is that correct?

*(Professor Bhattacharyya)* Yes, but there is a reason for it. You can be science, engineering, arts or any graduate and you can go and get an MBA. When I talk to my colleagues in the business schools they have a genuine explanation, and they say: ours is a generalised degree and whether you are running a supermarket, a bank or a complex company we give them exactly the same material, we cannot do any different. If that is the case, it is important that people who are managing technology not only should have a greater understanding of technology but also should know how to manage it so it has got to be done by people who do understand it.

1546. And your two and a half year IGDS course is what might be called a kind of sandwich course: they spend time in their companies, then come to you for some time, and it is totally integrated with the company and all the management functions with technology?

*(Professor Bhattacharyya)* Yes.

1547. Is the Cranfield school the nearest to you of all the business schools?

*(Professor Bhattacharyya)* I should have thought so.*Lord Gregson*

1548. This philosophy, of course, has been totally endorsed by a previous report of the Select Committee in respect of what you have just said, and we have very much supported your view.

*(Professor Bhattacharyya)* When we started in 1980, you see, you must understand that there was a great deal of polarisation. It is only now that things are improving. It has taken ten years for that to happen. At that time it was quite difficult. We do not have any examinations. The argument has been that if you can trust your surgeon to get his degree without an examination you might as well trust an engineer.*Lord Kearton*

1549. What is your relation with the major institutions?

*(Professor Bhattacharyya)* Difficult.*Chairman*

1550. On engineering, do you mean?

*(Professor Bhattacharyya)* Yes.

1551. Can you expand that and say in what way difficult?

*(Professor Bhattacharyya)* When we have accreditation and people from institutions come, it is



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[Continued

[Chairman Contd]

such a departure for them that it is difficult for them to come and assess the validity within their own little boxes, so to speak.

1552. You mean the validity of your course?

(*Professor Bhattacharyya*) Yes, because the might of so many companies is there. They come and say: why do you not teach industrial engineering in such-and-such a way and do *that* in such-and-such a way. We say: hang on, this is a customer-host relationship and we have jointly decided how it is to be done, and if that is what the market wants, that is what it will have.

*Lord Kearton*

1553. You must clearly think that the institutions are out of date in their approach?

(*Professor Bhattacharyya*) Yes.

*Chairman*

1554. Because they are looking too narrowly?

(*Professor Bhattacharyya*) Not only because they are too narrow but, what is a more important issue is that they have very simplistic measures. The Institution of Production Engineers, for example, will say: if we are going to change the title of manufacturing and call it a manufacturing system, if you use the Japanese approach you will solve the problem. Alternatively, they will say: what we really need is another 1,000 engineers. In the United Kingdom I do not believe we should dilute our undergraduate engineering degrees. We must have the same rigour that our competitors have. The tendency has been to dilute it.

*Lord Gregson*

1555. What is your criticism of ACME as a way of administering government funds? I know all the ACME records, and I have not seen a single criticism from Warwick. What is your criticism?

(*Professor Bhattacharyya*) I have no criticism from Warwick!

(*Dr Davies*) Let me give a simple example. From our own experience and talking to people from other universities we found that if one agrees with an ACME co-ordinator on a programme, the industrial contribution and all the rest of it, that will be funded. If we talk to a co-ordinator of another programme and he thinks what we are doing is absolutely super, if it then goes back, and the peer review gets at it, it might not be funded. My perception is that the ACME model, however it is working, is working much closer to what we are proposing.

1556. Would not ACME as a model satisfy your requirements?

(*Professor Bhattacharyya*) No.

1557. Why?

(*Professor Bhattacharyya*) Unless industry produces a minimum of 50 per cent in hard cash in actually carrying out the research they will not use it. If it is for producing PhD students, if it is for training, fine.

1558. It is not a training scheme.

(*Professor Bhattacharyya*) If it is not a training scheme then the company should produce 50 per cent in hard cash and control it.

1559. When you say hard cash, what about equipment provided—is that hard cash?

(*Professor Bhattacharyya*) Yes.

1560. And you are saying they do not produce 50 per cent hard cash?

(*Professor Bhattacharyya*) Yes.

1561. You are saying that they do not produce 50 per cent hard cash?

(*Professor Bhattacharyya*) No, they do not.

1562. Can you give an instance, because I will take it up with the Auditor General?

(*Professor Bhattacharyya*) I have programmes with ACME where my industrial contribution has been nothing in cash.

1563. And that has been reported back to ACME?

(*Professor Bhattacharyya*) Why should it be reported back to ACME—that is the way it operates?

1564. It is not, I am afraid.

(*Professor Bhattacharyya*) We are talking about ACME as administered by SERC. I think we are getting into the sort of details, my Lord Chairman, which are personal. What in general I am trying to say is this. Unless—and you are in industry, you have all been in industry—you are seeing that the research you are doing fits in with your business plan and, in order to fit in with your business plan, you are prepared to commit some money, it is only going to be a side thing, so to speak.

*Chairman*

1565. Let us come back to a slightly different aspect. Your IGDS seems very constructive and very valuable. Our previous witness was very insistent that the problem of manufacturing industry is very largely the failure of top management and that we do not have enough good top managers who understand the sort of problems about which we have been speaking. Would you believe that if there

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[Continued

[Chairman Contd]

was a great expansion of the kind that you are doing at Warwick or that may be duplicated elsewhere it would make a substantial and significant contribution to improving the top management of British manufacturing companies as they got to reach the top?

(*Professor Bhattacharyya*) From our experience, yes. If you go and ask Sir Graham Day, if you go and ask Lord Tombs, they will tell you.

Lord Gregson

1566. Maybe they are not good enough. Why should we ask them?

(*Professor Bhattacharyya*) Because you can actually monitor the changes that have happened in these organisations over the last few years during that time, and any criterion you care to use will show success.

Lord Kearton

1567. I happen to know that the contribution made to Rover is enormous. I did not know that you had this wide spread of all these other companies.

(*Professor Bhattacharyya*) Oh, yes, we have our "grade A" partners, the first tier partners. They are Rolls-Royce—major partners—who send on average about 60, 70 people every year, then Rover, Jaguar, Vickers, British Airways and so on.

Chairman

1568. There is evidence in all these companies that the people whom you have trained have made a substantial new contribution to their success?

(*Professor Bhattacharyya*) Yes, and one way of judging that is that they have been with us for the last ten years.

Lord Kearton

1569. And, as I understand it, you are expanding anyway?

(*Professor Bhattacharyya*) Of course. In fact, they are now advising their suppliers. British Aerospace, Rolls-Royce, within the society of aerospace manufacturer companies, made representations at the beginning for them to join so that at least in the aerospace environment there is a pool of people, and similarly so in the automotive environment. Some of the companies who approach us we cannot take because it is a club and it has certain criteria.

Chairman

1570. You cannot take them? Why not?

(*Professor Bhattacharyya*) If they are highly competitive with one another it gets very difficult. If I took Rolls-Royce and Pratt and Whitney I should be in trouble, the whole programme gets diluted and so on and so forth.

Lord Kearton

1571. I have not heard you mention electronic, or electronics engineering.

(*Professor Bhattacharyya*) Oh, yes, we are in electronics and in mechanical. The sector that we are not in is civil. I recently had a meeting with Sir Bill Mitchell; he has been asking for some time how we should be able to expand this into other sectors and other universities. There is no problem, I think one can do it, provided that universities do not consider that it is just free money to cover them in the long and medium term.

Chairman

1572. Are you in chemical engineering?

(*Professor Bhattacharyya*) We are just in the process of starting chemical engineering with a master's programme.

Lord Kearton

1573. I have been struck with the 140 staff. That is a big department?

(*Professor Bhattacharyya*) Yes.

1574. How many of those are professorial, senior lecturers or whatever?

(*Professor Bhattacharyya*) We do not have such status.

1575. What do you have?

(*Professor Bhattacharyya*) What we have is UGC staff, about ten or 15, I think?

(*Dr Davies*) About 14 posts.

1576. And all the rest are seconded?

(*Professor Bhattacharyya*) All the rest are university employees—I will come to secondment later—and we give them titles like directors. Peter Davies is a director. He was in CPRS and the Cabinet Office, and I said, well, now you have been talking about it, come and do something about it, so he came. I call him a director, and I can give him any salary that I wish.

Chairman

1577. That applies to all your people?

(*Professor Bhattacharyya*) It applies to all our people. I give them all cars and other fringe benefits.

Lord Kearton

1578. If I may say so, this seems to me extremely sensible!

(*Dr Davies*) Perhaps I may just clarify the numbers: 140 is our own staff employed by the university.



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[Continued

*Lord Gregson*

1579. Full time?

(*Dr Davies*) Yes. About 14 are traditional lecturers, senior lecturers, professor, whatever. There will be some support staff and secretaries. The vast majority of the 140—I think that it is over 110—are employed therefore on contracts that are tied to external income.

(*Professor Bhattacharyya*) There is a contract.

(*Dr Davies*) The industrial seconded staff are in addition to that number.

*Lord Kearton*

1580. By definition people like yourself must be at least professorial grade?

(*Dr Davies*) Yes.

(*Professor Bhattacharyya*) Oh, yes, I think he gets more than most professors at university. We have people there, equivalent to professors, in their late twenties. One thing I have avoided, however. There are some companies that will pay £10,000 and give the chairs a title, "Company so-and-so, chair of so-and-so". I have said to people: look, I do not want you to supplement posts. If a company wishes to completely fund a Chair, which is a very expensive undertaking, that is acceptable; but buying a title for a relatively small sum is not acceptable.

What happens is that, if I have a chair of company X, company Y does not come. We want to be as independent as possible within the environment. For example, although we do not take people in IGDS from Ford they will come into research with us.

Lord Kearton] The fact that you started at the University of Warwick seems to me incidental. You could stand on your own two feet and be proud.

*Chairman*

1581. Just before you answer that could you give us an idea of how you fit into the university? Are you a separate unit?

(*Professor Bhattacharyya*) No, we are a full part of the university. Most of the units within my group are self-financed. I wanted it that way. Since I came I have built an advanced technology centre, and I have just had authorisation for another £1.6 million worth of building—this is at full commercial interest.

(*Dr Davies*) We are part of the engineering department.

1582. How does the university help you? Could you be just as viable and valuable as a quite separate unit outside?

(*Professor Bhattacharyya*) The problem is the respectability of the postgraduate programme. The postgraduate programme requires both respectability and standards.

*Lord Kearton*

1583. This is the validation of degrees by the university?

(*Professor Bhattacharyya*) Yes, that is number one. Secondly, if I care to get people who are experts from other parts of the university—law or the economics departments—I can do so without any problems, and without worrying about standards. You see, I bent over backwards, because I knew we were trying to break new ground, to maintain standards. I had more than one external examiner of the programme and I made sure they were all academically respectable people who came. Once the trust is developed, things can happen quite easily. On the engineering business management programmes we were asked how can an engineering department do a business management programme. Then considering all the successful industrialists I said, well, have they done an MBA, why are they chairmen to these companies? It is because they have learnt the business in an engineering environment. If you have gone through a rigorous engineering programme you have the mental faculties to do so.

*Chairman*

1584. And do all or most of your students have engineering degrees?

(*Professor Bhattacharyya*) Engineering or science. What I am trying to say is this. There are a lot of industrialists who keep on saying, we do not have enough engineers, we do not have this, we do not have that. However, as a nation, I think that we do produce good quality engineers at undergraduate level. What we do not do is develop them afterwards.

*Lord Gregson*

1585. You do not do any distance learning?

(*Professor Bhattacharyya*) No, it is so interactive.

1586. Why not?

(*Professor Bhattacharyya*) I tried. We have a programme in Hong Kong where we have a graduate development programme for Japanese companies in Hong Kong. We have the big Japanese companies, and they want the same programme. I suggested distance learning, but the attractiveness, the decision making process with the people, between the people and the lecturers concerned, disappears. Distance learning is all right when it is a mechanistic subject.

1587. Stamford distance learning is interactive: it is done always with a tutor.

(*Professor Bhattacharyya*) Yes, in mechanistic subjects. If I am teaching somebody —

1588. Can I just finish what I am saying. They are also now developing interactive video alongside

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[Continued

[Lord Gregson *Contd*]

it, and they do all the NASA programmes. Does that not grip you as a possible extension for your activities?

(*Professor Bhattacharyya*) Yes, it does. I have seen that, my Lord Chairman. In the MIT programme that has recently been launched they have realised, they have done this, they have experimented with interactive. It is more expensive for people to go from Seattle to Boston every week. However, they then realised that the interactiveness between the people—say one fellow from General Motors, one fellow from Boeing and one fellow from General Dynamics—where they are able to interchange ideas disappears. It is easy for us to do a distance learning programme, but our customers do not want it.

Chairman

1589. May we come back to the replication of what you are doing. What you have told us is most interesting and seems very constructive. Do you see great problems in expanding more yourself to have a bigger output or do you think that it would be better if two or three other centres of excellence of your type could be set up in other parts of the country?

(*Professor Bhattacharyya*) I have just been advising the Scottish development authority, the University of Strathclyde and Heriot-Watt to set one up there. They have been with me for the last eight to nine months looking at things. We have now selected the companies. I start by choosing the companies and getting them to have faith in the programme with Strathclyde and Heriot-Watt. The problem is that, unless they have gone through the process that we have gone through, it becomes very difficult to develop trust. What I have done therefore is to act as an intermediary for the time being. It will be set up very soon in Scotland.

1590. Do you have more people who would like to come on your course than you can accommodate?

(*Professor Bhattacharyya*) Yes, we could double or triple it.

1591. It looks to be highly desirable therefore that there should be other institutions similar to yours set up in your view?

(*Professor Bhattacharyya*) Yes. We will do everything—I have told Sir Bill Mitchell. The cost of the programme is that 10 per cent comes from SERC, that is, of real costs; and 90 per cent is provided by the companies. I have said to SERC that if they are prepared to put in, say, 75 per cent of the cost to start off with in some new universities or in other places I will help them do so, and then they can —

Lord Gregson

1592. I am sorry, I am a bit lost. You said 10 per cent from SERC, but your slide said 10 per cent university —

(*Dr Davies*) No, we are talking about IGDS. Ten per cent of the real costs of that comes from SERC.

1593. What about the University Funding Council contribution?

(*Professor Bhattacharyya*) None.

1594. But that is not what you said. It is not what the slide said.

(*Dr Davies*) Of the total turnover 10 per cent comes from UFC, that is, mainly undergraduate lecturers. If you then consider the postgraduate and research activities, part is IGDS and of that part 10 per cent comes from SERC.

1595. What about the postgraduate MBA?

(*Dr Davies*) That is IGDS.

Chairman

1596. And what about postgraduate engineering, how is that financed?

(*Dr Davies*) That is IGDS.

Lord Gregson

1597. How is that financed?

(*Professor Bhattacharyya*) Ten per cent —  
Lord Gregson] SERC?

Chairman

1598. Let the witness answer.

(*Professor Bhattacharyya*) The postgraduate Engineering Business Management Programme has just started. It will be funded exactly like the manufacturing programme, the design programme or the IT programme, which is 10 per cent SERC and 90 per cent industry. In fact, I have not approached SERC yet for the 10 per cent contribution even for the Engineering Business Management programme.

1599. I have just one last question. What is the main obstacle and difficulty of replicating your organisation elsewhere, in Strathclyde, for example?

(*Professor Bhattacharyya*) I suppose that I was lucky. When I went to the university industry was on a low. Therefore, we could attract a lot of people. Lord Butterworth at that time was the vice-chancellor and he was keen on developing the industrial scenario with the result that the university commitment was total. Anything that I had asked for prior to my coming was provided. Although we paid it back to the university there was no



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[Continued

[Chairman Contd]

bureacracy there. There is no obstacle. I can make a decision; I can go and say to the administration, right, I want a building for £2 million, and within a short time I will get a decision. Other universities have to learn that. That is number one.

1600. You are saying that it is difficult *prima facie* in other universities?

(*Professor Bhattacharyya*) Yes, it is. Secondly, they must also learn that the universities themselves cannot provide everything. They have to go to industry and say: hang on, look, you are the experts in these areas, why do you not come and help our postgraduate students. Sixty per cent of my programme gets done by outside people. Thirdly, I think that SERC should become a little more proactive in this area.

1601. There needs to be a bit of pump priming from SERC or some other source?

(*Professor Bhattacharyya*) Yes.

*Lord Kearton*

1602. I think I read that you had the Prime Minister there not long ago. Could she not push it forward?

(*Professor Bhattacharyya*) There is no reason why she should. She was very pleased. The Prime Minister has been in touch with the programme for

a long time. She met quite a lot of the youngsters that have gone through the graduate development scheme. If you have the time—I know that you are all very busy people—come down to Warwick and I will take you to Cowley, the plant with which we experimented.

*Chairman*

1603. Perhaps we may take you up on that.

(*Professor Bhattacharyya*) Cowley, my Lord Chairman, as you know, was a terrible plant. The average age of a production manager there now is mid to late twenties, all graduates, or equivalent, most on the graduate development programme, and they are all totally accountable and have total authority. If you see the way they are managing it is quite amazing!

*Lord Kearton*

1604. As a final question, do you have any contacts with Nissan or Toyota?

(*Professor Bhattacharyya*) Very good contacts with Honda, of course.

Chairman] Professor Battacharyya, may we thank you very much for a most interesting afternoon. It has been very complementary to the evidence we had earlier putting such emphasis on the importance of good management in manufacturing so it has been most valuable.

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4 July 1990]PROFESSOR S K BHATTACHARYYA  
and DR P T DAVIES[Continued

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**Slide 1****INNOVATION IN MANUFACTURING INDUSTRY**

- \* the key challenges in industry
- \* how Warwick Manufacturing Group responded
- \* lessons learned
- \* proposed changes to public sector funding

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**Slide 2****WARWICK MANUFACTURING GROUP**

- \* started in 1980 by Professor S K Bhattacharyya
- \* as a partnership between manufacturing companies and academic excellence
- \* building on the international state of the art

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**Slide 3****ENGINEERING MANUFACTURING INDUSTRY**  
legacy of the 60s and 70s

- \* uncompetitive
  - \* weak in decision-making
  - \* riven with industrial unrest
  - \* lacking good quality manpower
-



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4 July 1990]PROFESSOR S K BHATTACHARYYA  
and DR P T DAVIES[Continued

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**Slide 4****SUSTAINED INNOVATION NEEDS**

- \* stability and profitability
- \* managers with
  - forward vision
  - accountability
  - ability to manage technological change (technocrats)

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**Slide 5****NO SHORT CUTS**

- \* clear thinking not “japanese” nostrums
- \* avoid over-dependence on the consultancy culture
- \* financial climate not main problem (cf other industrial sectors)
- \* too much emphasis on technology transfer “gap” and mechanisms

ABOVE ALL, SUCCESS DEPENDS ON PEOPLE

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**Slide 6****IMPLEMENTING THE STRATEGY REQUIRES**

- \* board level commitment
  - \* technological awareness at director level
- 
- |                                                                                                                                |                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>* well trained young staff to make changes</li><li>* retrained middle managers</li></ul> | <ul style="list-style-type: none"><li>* R&amp;D to remove technological barriers</li><li>* technology transfer and continuing support</li></ul> |
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4 July 1990]PROFESSOR S K BHATTACHARYYA  
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**Slide 7****THE FIRST PRIORITY**

- \* to develop decision-makers with accountability and authority
- \* able to manage change in a technological business

**QUALITY MORE IMPORTANT THAN QUANTITY**

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**Slide 8****RAW MATERIAL**

- \* not undergraduate
  - too long a lead time
  - too much inertia to change courses
  - manufacturing not a suitable undergrad discipline

hence start with:

- \* degree of equivalent
- \* industrial experience

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**Slide 9****INTEGRATED GRADUATE DEVELOPMENT SCHEME (IGDS)**

- \* modular Masters degree
- \* part-time
- \* defined and run with a consortium of companies

Integrates career development with vocational education

Conceived and developed at Warwick in 1980

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[Continued

## Slide 10

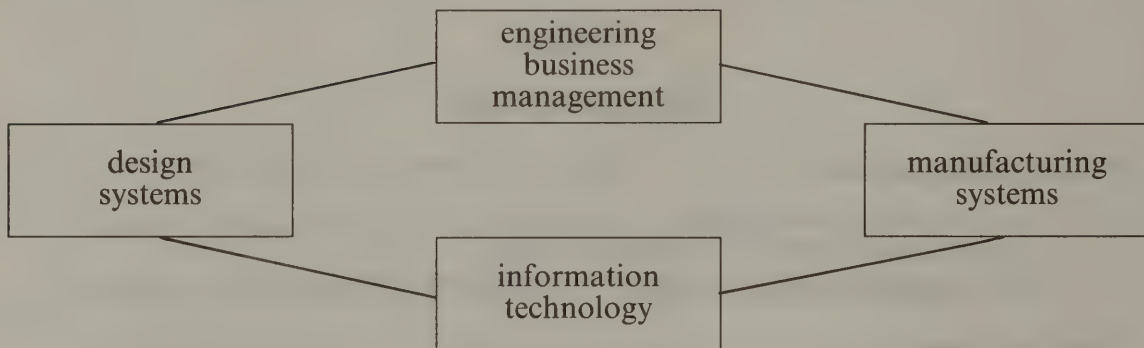
## IGDS GROWTH

- \* currently over 400 industrial participants
- \* from over 40 companies

THE LARGEST PROGRAMME OF ITS KIND

## Slide 11

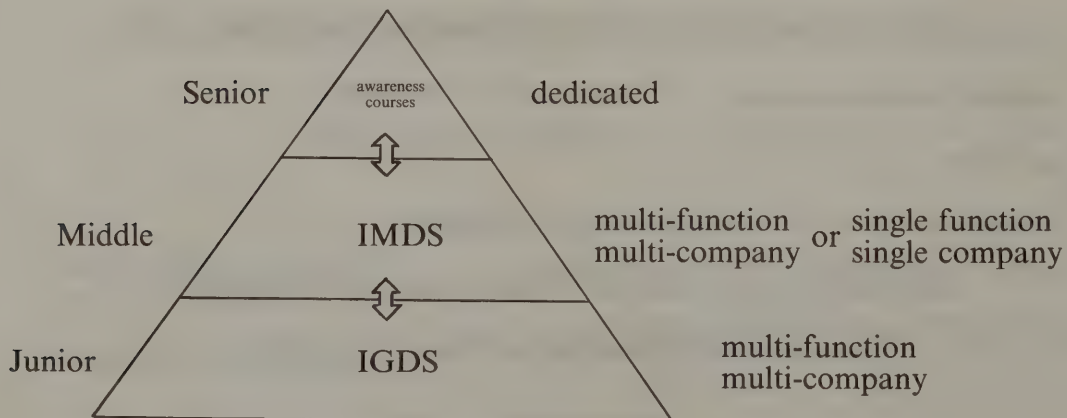
## IGDS CONTENT



OVER 50 MODULES IN TOTAL

## Slide 12

## MANAGEMENT DEVELOPMENT &amp; TRAINING



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[Continued

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**Slide 13****MULTIDISCIPLINARY RESEARCH**  
from management to molecules

- \* operational performance
- \* organisation of manufacturing
- \* computer stimulation
- \* information technology and automation
- \* materials and processes
- \* catalysts and surface studies

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**Slide 14****COLLABORATIVE TECHNOLOGY TRANSFER CENTRES**

- \* for R&D and demonstration
- \* facilities provided by partner companies
- \* university and company staff in joint teams

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**Slide 15****COLLABORATIVE CENTRES**  
with over 40 companies

- |                                                   |                                                                          |
|---------------------------------------------------|--------------------------------------------------------------------------|
| * Advanced Technology Centre                      | Rover, Rolls-Royce                                                       |
| * CAD/CAM Centre                                  | Computervision                                                           |
| * CIM Facility                                    | Digital, John Brown Automation,<br>Cincinnati Milacron and 10 other co.s |
| * Simulation Centre                               | consortium of companies                                                  |
| * Catalysis and Surfaces Unit                     | Unilever, Kratos, Rover                                                  |
| * 10 Teaching Companies                           |                                                                          |
| * close collaboration with Science Park companies |                                                                          |
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4 July 1990]PROFESSOR S K BHATTACHARYYA  
and DR P T DAVIES[Continued

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**Slide 16****THE WARWICK WAY**

\* awareness courses  
and brainstorming

\* IGDS and  
full-time MSc

\* IMDS and  
short courses

\* multidisciplinary research  
management to molecules

\* collaborative technology transfer  
centres – ATC, CAD/CAM, CIM,  
Simulation, Catalysis & Surfaces,  
Teaching Companies, Science Park

**EXCELLENCE WITH RELEVANCE**

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**Slide 17****SINCE 1980 THE GROUP HAS GROWN TO:**

- \* over 140 staff plus industrial secondees
  - \* generating an annual turnover of £9 million with only 10 per cent from the UFC
  - \* over 2,500 managers and technologists on courses each year
  - \* over 500 postgraduates on part-time and full-time Masters degree programmes
- 

**Slide 18****BREAKTHROUGHS**

- \* uniting management education and technology
  - \* a new breed of technocrats
  - \* truly multidisciplinary research
  - \* technology transfer by people transfer
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4 July 1990]PROFESSOR S K BHATTACHARYYA  
and DR P T DAVIES*[Continued]*

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**Slide 19****KEYS TO SUCCESS**

- \* priorities settled in partnership with companies
  - \* fast response without bureaucratic delays, in both companies and University
  - \* clear accountability for decisions and results
  - \* bulk of funding and equipment from companies
  - \* joint teams with company staff
- 

**Slide 20****PUBLIC FUNDING OF APPLIED RESEARCH  
AND NEAR-VOCATIONAL EDUCATION**

good news

- \* trend towards joint DTI-SERC funding, e.g., IGDS, LINK Teaching Companies
  - \* significant industrial contribution required in more cases
  - \* trend towards directorates and co-ordinated programmes
- 

**Slide 21****PUBLIC FUNDING OF APPLIED RESEARCH  
AND NEAR-VOCATION EDUCATION**

bad news

- \* peer review is bureaucratic and lacks accountability
- \* part-time industrial committee members do not ensure industrial commitment
- \* company contributions often soft-money, not hard cash or equipment
- \* most effort goes into initial selection not monitoring deliverables
- \* DTI and SERC officials and process not aligned

**RESULT IS WASTED PUBLIC MONEY  
INVENTION WITHOUT INNOVATION**

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4 July 1990]PROFESSOR S K BHATTACHARYYA  
and DR P T DAVIES[Continued

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**Slide 22****PUBLIC FUNDING OF APPLIED RESEARCH  
AND NEAR-VOCATIONAL EDUCATION**

## proposals

- \* directorate approach with no peer review, i.e., formulate programme and be responsible for it
  - \* directorate staffed with industrial, academic, and public sector full-time secondees
  - \* all programmes to have 50 per cent funding of HEI costs from companies
  - \* directorate administers public funds on behalf of DTI and SERC but with fast response and no second guessing
-





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MINUTES OF EVIDENCE  
TAKEN BEFORE THE  
SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 11 July 1990

**GENERAL ELECTRICITY COMPANY, PLC**

*Lord Weinstock and Dr Steven Cundy*

**LUCAS INDUSTRIES, PLC**

*Dr J Parnaby and Dr J Garside*

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*Ordered to be printed pursuant to the Order of The House of Lords of  
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WEDNESDAY 11 JULY 1990

Present:

Chorley, L.	Taylor of Gryfe, L.
Clitheroe, L.	Vinson, L.
Gregson, L.	Whaddon, L.
Kearton, L. (Chairman)	

### Examination of Witnesses

LORD WEINSTOCK, a Member of the House, Managing Director, General Electric Company plc, examined;  
and DR STEVEN CUNDY, Hirst Research Centre, General Electric Company plc, called in and examined.

*Chairman*

1605. Lord Weinstock, Sub-Committee I of the Select Committee on Science and Technology are conducting an inquiry into innovation in manufacturing industry. The Chairman, Viscount Caldecote, is unfortunately not able to be here this afternoon and has asked me to take his place for this session. Do you want to make any preliminary statement?

(*Lord Weinstock*) No, we thought that we would answer your questions and then if at the end of the session either you or we thought the answers had not given full satisfaction we could write to you.

1606. I remember vividly when you came before the Select Committee on Overseas Trade about five years ago. Have you attended a select committee since then?

(*Lord Weinstock*) No.

1607. Your evidence at that time, if I may say so, was very colourful and dramatic. I think it is fair to say that although the report was viewed with some scepticism by Government many of the recommendations have since been adopted as government policy, a little belatedly perhaps. The common theme between that inquiry and the present inquiry of course is the paramount importance of manufacturing industry and how to make ourselves more internationally competitive in the future. Your own company is one of the key companies in Britain with a remarkable growth record and export record. We felt your own experience very relevant to the present inquiry. From your own experience of product development and manufacture in a number of different countries what sort of regulatory framework and government policy is most effective in stimulating innovation?

(*Lord Weinstock*) That looks like a straightforward question, but I do not think it is, in fact. For example, I find some difficulty in seeing that Government can stimulate innovation although I do see quite clearly that Government can stifle innovation. Innovation after all is not a mechanical function. It depends on the inventiveness of particular human beings, their brains and their minds. If one looks at comparisons in different parts of the world no clear rules emerge. One could say, for example, that the Soviet Union operates in an economy and industrial organisation that is inefficient and can not produce consumer goods, yet is able to make enormous technical progress in space and in weapons. If somebody said to me, what sort

of arrangements would we like to see in order to stimulate innovation, I would find it quite difficult to set out a set of rules that told you exactly what sort of governmental environment stimulates innovation. One can also offer some passing comments. You used the words "regulatory framework". This makes me think back to the 1950s and 1960s and what used to be called 'stop-go'. In the field of consumer durables, which had a particular interest for me at that time, the terms of trade were changed by the Government every few weeks. There was a phenomenal number of changes in a relatively short time so that any form of long-term planning became impossible. In due course we had swept away the system of resale price maintenance, which was thought to be anti-competitive. That also made for instability in the market. Anything that makes for instability is hostile towards long-term expenditure of one sort or another, and particularly organised methods of encouraging innovation. If somebody gets a good idea it will come out; he will use it in some way in any case. Quite a lot of innovation has to be approached from an institutional point of view, you have to encourage it and bring it about, and then instability is the biggest enemy.

*Lord Gregson*

1608. You imply, Lord Weinstock, that Government has not too much effect on the operation of industry other than by overall economic factors. Does the same apply to the shareholders through the Stock Exchange, for instance?

(*Lord Weinstock*) If I may correct the first part of the statement, I was dealing with a general proposition that the Chairman put to me. If we take areas where the Government is a purchaser—that of course was a much wider area a little while ago than it is now—the Government has a very direct influence on innovation. If one takes the field of defence where innovation is particularly important, the Government pays for development of products it wants; it has a specification and gives industry the job of fulfilling it. My general answer therefore excluded situations where the Government is directly involved. In so far as the City is concerned, I have not noticed any respect in which the City encourages or discourages innovation in industry. In its own field, the City is an extremely innovative place: they think up very regularly new ways of doing things to keep the City-type activity going.

1609. When this Government and previous governments had broad programmes in support for



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LORD WEINSTOCK  
and DR STEVEN CUNDY

[Continued

[Lord Gregson Contd]

innovation and for product development, your company took a large part in those programmes, some said too large a part. Those have now virtually ceased. Does that reduce your efforts in innovation?

(Lord Weinstock) No. The programmes you are talking about were presumably Alvey?

1610. No, I mean that the Department of Trade and Industry had two large programmes: the first was the Product and Process Development scheme and the second was Support for Innovation, on which they dealt one to one with companies in supporting particular innovation or particular products for development, and GEC had a very large part in that programme?

(Lord Weinstock) Yes, it is Alvey. It is the thing that followed the recommendation of the Alvey committee —

1611. Prior to Alvey.

(Lord Weinstock) Perhaps one can stick to that programme to spend £350 million over five years to be funded equally by the Government and by industry. It was a matter on which I happened to be consulted at the beginning. The original proposal was that the Government should pay 90 per cent and industry 10 per cent. I thought that was wrong; industry and Government should share equally the risk and the cost. That was essentially an experimental idea. It was said that the Japanese and others had been able to encourage innovation by this means, people working together at the pre-competitive stage—whatever that means—and we ought to try it. I took the view that £50 million a year for seven years, half paid by industry and half paid by Government, was not an unreasonably large amount to spend on making the experiment to see whether that would give an important stimulus to innovation. The conclusion that I came to—having, as you say, involved ourselves very heavily in these programmes—was that it did not. Not nearly enough came out of it. In the end it was a matter of judgment whether you could do something because there was government assistance, and whether that was a good enough reason in itself to act, or whether you really needed to do it for the sake of your business, which is to say you could not afford *not* to do it if you wanted to stay in business. Dr Cundy runs our Hirst research laboratory and may have a more expert opinion.

(Dr Cundy) My Lord Chairman, only to stress that the Alvey programmes and every scheme recently introduced by the DTI are pre-competitive research programmes. The research may be one part of the innovation chain, but it is not the total part of the innovation chain.

1612. Prior to Alvey most programmes were not pre-competitive but much nearer the market. In a number of programmes I was responsible for as chairman of one of the science boards GEC had a

very large part, but they were programmes contracted completely between the DTI and GEC, and they were near market. As far as I know they were very successful programmes. I am going back 10, 12, 15 years, in effect.

(Lord Weinstock) Perhaps your memory is longer than mine, but you would have to give us more detail before we could comment. I can think of one thing. We built a windmill, for example, up in the north of Scotland. That was DTI-funded.

1613. The Department of Energy, I am afraid!

(Lord Weinstock) Oh, was it? There you are.

Lord Taylor of Gryfe

1614. Lord Weinstock, I have a related question. You were heavily involved in the interesting development of the telephone exchange, System X, I think, together with the Government, British Telecom and Plessey?

(Lord Weinstock) Yes.

1615. That was jointly funded because industry had identified a market requiring rapid change. It was not particularly successful, as I recall. Were there any lessons in that experience? It was very expensive funding, of course, the initial research, and it was innovative. Why did it not succeed?

(Lord Weinstock) You say it was not very successful, but in my opinion—and that is backed by a certain amount of technical observation from people with whom I have to work—System X is the most up to date, efficient and cost effective telephone exchange in existence, so I am not prepared to accept that it was not successful.

1616. Who bought it though?

(Lord Weinstock) BT bought it because it was designed for BT, but it has now been sold elsewhere.<sup>1</sup> You cannot just sell a telephone exchange as if it was a packet of soap powder; it has to fit into a network that already exists. The networks that exist round the world are controlled either by the national authorities; they were often at one time owned by the large telecommunication companies who were interested in the particular parts of the world, like Siemens in Latin America. Although those networks were in due course nationalised, the technical culture, the connections, the supply of spares and the training so linked those networks to the original supplier that it was very difficult for anyone else to break in. In connection with the Olympic Games I remember in 1966 we succeeded in breaking in to the transmission system in Mexico. It needed only the support of ECGD to

<sup>1</sup>Note by the witness: It has also been sold to Mercury and Hull, the other two public telecoms operations in the UK, and exported to Gibraltar, St Vincent, Philippines, Falkland Islands, Kenya and to China for railway communications.

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LORD WEINSTOCK  
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[Continued

[Lord Taylor of Gryfe *Contd*]

match what the Japanese were doing in order to land very substantial contracts on which we worked in conjunction with Philips. We managed finally to get ECGD support two days after we lost the final instalment of the contract; thus, inadvertently, we established Philips telecommunications in Mexico. Those things have to be done with government assistance; without ECGD cover and matching financial arrangements you cannot beat the competition. If we want to talk about telephone exchanges, it is a very long story and, as I think Lord Kearton knows, we have to go back into the distant past. System X was in fact the only development that I have seen in my time in this industry that had a chance of being internationally competitive. When you have one customer, which was the position of the British industry, you really cannot tell him what he is going to buy; he tells you what he wants. A lot of mistakes were made along the way. What was then the Post Office took the decision that they would jump from the old Strowger step-by-step system to a fully electronic system. In fact GEC built a fully electronic telephone exchange at Highgate Wood—28 years ago. This worked very well, but we did not have the technology to match the concept; there were no semiconductors, it had to run off glass valves—it was an enormous consumer of energy, and it was uneconomic. Then they decided not to buy the Crossbar exchanges offer from Plessey and from us, but then later bought them not as a matter of policy but virtually as a matter of inevitability. Then they chose to move to a reed relay telephone exchange called TXE4, which was said to be highly exportable and of which the industry never exported a single line so far as I know. Then the whole thing blew up, everybody got very cross, and a proper programme was set up for System X, which has been immensely successful.

1617. This experience has been repeated in Japan where the main customer dictates what you supply and therefore consequently excludes you from the main market. Surely there ought to have been closer collaboration to ensure that your technology fitted not only with British Telecom's requirements but also the market that was rapidly being overtaken by the Japanese?

(*Lord Weinstock*) Well, of course, that was what industry had been saying for decades, but no one took any notice!

*Lord Vinson*

1618. Lord Weinstock, may I go back to the word "stifle" that you used because I hope that one of the consequences of this enquiry will be to highlight obstacles that prevent innovation flowering, and by innovation I think that we mean the development of ideas into world marketable products. The financial regime in this country whereby we have tried to control inflation by a single monetary weapon, high interest rates, has meant that we keep our interest rates or real interest rates

much higher than those of many other countries. Hence in funding any new project the rates of return on that have to match what we will get on the street. Your company has been very fortunate never to be strapped for cash; in fact, it has been the other way round. It surprises many onlookers, I think, that there were not more potential outlets for backing world beaters in your company that would have been a better outlet than on the street. May I take it therefore that the real rate of return was unattractive in terms of backing innovation and more attractive than leaving it on the street?

(*Lord Weinstock*) No. The reason we did not make other products was that we did not see stable markets for them. There is what I was saying before about the change in conditions of trade and hire purchase restrictions. Even the way that colour television was introduced in the UK was completely wrong. All those things which create instability and make it impossible to forecast what will happen, deter you from investing in a field particularly vulnerable to that sort of action, like consumer durables.

1619. That is where the United Kingdom market is a key and high portion of the potential sales outlet but as a world operator the fluctuations on the United Kingdom are important and presumably should be taken against the fluctuations of the likelihood of world demand for one's product and one could look to other companies where there have been plenty of projects funded round the world by comparable size companies that seem to have been a great success. Do you feel you have been over-cautious and this is perhaps conditioned by the volatility of the United Kingdom market?

(*Lord Weinstock*) I cannot answer the second part without an expansion of the first part—which company, which products?

1620. Take the whole of the United Kingdom domestic equipment, white products—you lost a very large percentage of that market?

(*Lord Weinstock*) GEC has 40 per cent of the washing machine market. We did not try to make electrical cookers until fairly recently; we have about 35 per cent of that market. In gas cookers, we have about 25 per cent, and we expect to build up to about 40 per cent of the dishwasher market. So far as domestic equipment is concerned I think we have not done badly. For many years we were faced with imports from Italy at cut throat prices. The companies who were exporting from Italy, with whom we had to compete, went broke one after another. They have nearly all disappeared into somebody else's hands. Some were reportedly with cheap steel from the Mezzogiorno and by other means. You had to be able to withstand all that or else there would have been no British industry at all. In domestic appliances therefore we have done rather well. In brown goods we have not done well; we have done badly. That was a business in which I



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[Continued

[Lord Vinson *Contd*]

started, and it was very painful. It is a rather complicated story in which we made a partnership with a Japanese company in order to take advantage of all the great Japanese virtues, which never seemed to shine through in that partnership. In the end it had to be abandoned.

Lord Gregson

1621. Would the same apply to goods like the video recorder and cam-recorder where a lot of the original inventions were British in the first place?

(Lord Weinstock) I am sorry, I do not hear you very well.

1622. Does the same apply to products like video recorders and cam-recorders where a lot of the original inventions were British? In fact, some of the licences are Japanese operated and still licensed from the United Kingdom. Why did we not develop such products in the United Kingdom? GEC was one of the few large companies capable of undertaking such development.

(Lord Weinstock) We have no experience in cameras. We do not make optical glass. It is not a technology that we have ever had anything to do with so I do not think we could have been expected to pick that up. When you come to the video recorder field you have exactly the position that I described before: enormous numbers of variations, stop-go in terms of trade, the impossibility to plan—not so much a discouragement to innovate as a discouragement to invest at all in capital facilities in factories that would be over-full in one month and three months later would be empty.

Lord Clitheroe

1623. Lord Weinstock, to what extent is innovation the key to a successful business, or is it that successful management creates innovation?

(Lord Weinstock) I do not think there is “the” key; if one says that and nothing else it is not right. Innovation is indispensable in maintaining a successful business. But there again you have to say quite what you mean by “innovation”. You do not have to be first if you are quick enough. It is better if you can get a unique idea that nobody else has because then you can exploit the market for much longer. One good example is the scanner that EMI developed several years ago. Then other people caught up. Without innovation there would not have been any medical equipment business for EMI at the time, although it ended badly in due course. You need other things besides innovation. I think “innovate” is a very inadequate word to use in this context. If you do not change as the times, the markets and the products require, you are dead.

Lord Chorley

1624. Following on from that, Lord Weinstock, and the size and variety of sorts of businesses that GEC is in, how do you stimulate innovation in GEC and how do you manage it?

(Lord Weinstock) You do not “manage” it, of course. Somebody thinking of a new idea cannot be “managed”. On the contrary, new ideas often come out of people who are put in rooms with money but no direction; we do not know what they do, except that the money disappears, but now and again a good idea comes out. You stimulate innovation by continually demanding new products from management. Our managers are required to make monthly statistical reports but are also required to say what they are doing in technology. We try to watch from the centre. We see quite a lot of these things physically. No one in the game that we play has any possibility of being long in the market place if he is not keeping up with the competition. One reads, for example, in a newspaper or in a technical journal of what someone else has done, and you raise immediately with your own people, why did *they* do that, not us. There is a constant, institutionalised process of reporting; and then you have a constant pulling of every bit of wool that sticks out of the knitting, that could indicate that we are missing something or we are defective somewhere, to see what happens. Apart from that we have Dr Cundy’s people, who run a central laboratory and a collection of separate laboratories belonging to the product units. They keep a watching brief to try to see that enough work is being done. It is not just a question of managing innovation. It is sometimes a question of encouraging or even making a man spend money on a technology that he really does not want to because he does not think it will be important enough to him alone; but maybe if we join two or three units together it is worth it.

1625. Some witnesses have said to us that it is not all a matter of organisation but organisation is important and you must have rather flat organisation; you must not be hierarchical, you must not have command structures and that sort of thing. Do you have any comments on that?

(Lord Weinstock) Not really; there is more than one way to skin the cat. It is what works. Very often one says this is a crazy way to do something but it works for me until it does not. It depends a lot on the people. There are some individuals who in an institutionalised environment do not function at all. There are some who need an institutionalised environment because otherwise their work is not sufficiently disciplined. There is one respect, though, in which they do have to be organised. That is that the aids available in development now, in engineering and in science through computers in one form or another are so great that it really is impossible to do important development work without being integrated into the technical system

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[Continued

[Lord Chorley Contd]

which is providing the means of using the computers. The software side of it has to be organised for people to get the results.

*Lord Taylor of Gryfe*

1626. Lord Weinstock, I think I heard you rightly talk of impediments in the short term, changes of Government and the abolition of resale price maintenance. I should have thought that resale price maintenance was a rather cosy arrangement for agreeing margins with distributors and protecting them in a way from competition? Do you not rate competition as one of the greatest incentives to change and innovation in so far as RPM inhibited, it fixed prices, it fixed margins and it was a very protective instrument?

(*Lord Weinstock*) It does not appear to have done the Japanese any harm. They seem to flourish quite well with it. I do not understand the argument that resale price maintenance inhibits competition. The competition is between the manufacturers at one level and the retailers/distributors at the next level. As between the different manufacturers surely you would not suggest that in electronic consumer goods there is any lack of competition?

1627. It limits consumer choice?

(*Lord Weinstock*) No. What it did was to enable us to market in an orderly way and ensure that the distributor/dealer maintained adequate technical resources to keep the customers happy. That was the great advantage. It was not cosy. When I joined the radio industry in 1954, I remember there were 23 manufacturers. At the end of 1961 there were about six. Now *that* was surely a time of competition. There was the influx of goods from Asia, but the abolition of resale price maintenance left the UK industry disorganised when distribution of a technical product needed a certain amount of organisation. I would not want to inhibit competition, but it has to be on equal terms.

1628. Lord Weinstock, you know what we are about: we are looking at the apparent failure of British industry to be sufficiently innovative. You are a prime witness who is steeped in the whole industrial scene and experience. What would you say are the three or four basic reasons that we are not innovative?

(*Lord Weinstock*) I do not agree that we are not innovative. I think we are very innovative. There are certain fields in which particularly the Japanese have targeted world markets by arrangements that we do not even know of but which obviously are in some form at least co-ordinated by MITI, the Japanese trade ministry, of which products near to our interests have been one of the victims. That has been quite pointed. If you want to know why we have not done as well as other people—although I still would not accept that we have done that badly—I think you have to go back through history to find out why

we are as we are and why we think as we do. You have the education system; the cultural background; the social hierarchy. There are a million causes in society that cause us to be as we are. I do not think that it does a lot of service to this country to take the view that we are inherently not innovative or that we do not innovate, mainly because it is not true. One has also to say that if one had to have in British society the features that make Japanese society what it is, I would rather live in Britain with all its shortcomings than be a Japanese living in Tokyo.

*Lord Vinson*

1629. May I come back to the financial constraints on innovation and the estimate that one has to make of the likelihood of the return on investment backing any innovative idea. We had a system of so-called free depreciation. There is nothing free about accelerated amortisation so it is a rather bad title. The generality of investment is now allowed, as you know, for tax purposes 25 per cent diminishing balance. Would you regard that as an adequately fast average national rate of amortisation or do you think that it is inhibiting in terms of replacement of plant?

(*Lord Weinstock*) I think that I am the wrong witness to ask that sort of question. I do not make those calculations. If you are in a business and there is a way of making the product better, which is even more important than making it cheaper, you do not have alternatives. If you want to be in a business you have to keep up to date, which means that you must spend the money on development and you must spend the money on plant. You do not have alternatives. It is a hypothetical choice you are discussing. Today we will get 15 per cent on our money by putting it in the bank. But we do not know for how long we will earn 15 per cent. We do not know what the real cost of doing that would be if we failed to spend as we ought to have done if that enables the competitors to flatten us one of these days. I do not think one has these options when one is committed to industry.

1630. There are two options, are there not: one is to maintain one's existing competitive position, and the other is to back new horses?

(*Lord Weinstock*) You always want to expand. To back new horses in completely different fields, then you may be right, but I personally do not believe that the industrialist's job is to expand into all sorts of things about which he knows nothing merely because he has the money to do it.

1631. Let us put it the other way round. Your company is financially very well organised and keeps its crock of gold and its own reserves very importantly behind it. However, we have an amortisation tax rate now which at 25 per cent diminishing balance nowhere near in the inflationary period we are going through allows depreciation to



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[Continued

[Lord Vinson *Contd*]

keep up with the replacement costs for goods one is writing off. Therefore, quietly, British industry is under-amortising the use of those tax rates or is being overtaxed because it is over-expressing the level of its profits compared to what the correct and proper rate of amortisation should be. Do you not feel taking the generality of companies that that is probably a rather bad thing?

(*Lord Weinstock*) Yes, and you are absolutely right about what happens with regard to the depreciation and tax aspect, that is for tax purposes, because when you make your accounts you can write down what depreciation you like.

1632. Yes, but the cash flow is affected by the tax.

(*Lord Weinstock*) Absolutely. I just suspect that if you said to companies in general in this country, you can increase your depreciation charge, you are going to get it allowed for tax, quite a lot would not do it because it would reduce their profits. You can see the headlines, "So-and-so profits only advance 10 per cent", which is considered a disaster these days. There is a lot of pressure on people not to do things that they ought to do. In general anything that reduces the tax charge and increases our cash holdings puts us in a better position to do something that we might otherwise have been reluctant to do. Generally speaking, therefore, you are right. Whether you would have that direct cause and effect universally is another matter. I think that you would create a sufficient effect to make it worth doing if the Government felt they could afford to allow the tax.

*Lord Clitheroe*

1633. You said just then that there are a lot of pressures that cause governments not necessarily to do the right thing. May I ask you whether those pressures are things that could be alleviated by any change of the rule book or is it a fact of life?

(*Lord Weinstock*) It has become a fact of life in recent years. There was always a certain pressure because there are very sophisticated institutions in the City with lots of analysts and there is a very sophisticated financial press. There is nothing you can do that would stop them from saying things that in their view are original; whether they are right is another matter. Their comments tend to start with the profit before tax. It may be happening now, perhaps, that people will take a little less short term view than previously. I read in the newspaper the other day just after we announced our annual results that it seemed to be taking a very long time for GEC's acquisitions to show through in terms of profits. That is the first report we have made since we invested about £1.3 billion, some of which had only been effective for a month, but it was already not too soon for them to say: "where are the profits?". It is a bit frustrating. Those pressures have an effect. I am not going to say that GEC would necessarily do anything that it would not otherwise have done, but it does have an effect; at the least it is depressing.

1634. Do you see it as worse in this country than others or are we on a par with the United States?

(*Lord Weinstock*) On the United States I cannot say authoritatively. In so far as some American banks are interested in our company, they have always been very supportive so I have not seen any sign of it. United States investors are very fickle and they will change their investments at the drop of a hat or let a computer do it for them. There is nothing like this situation in continental Europe. In France, in Germany, in Italy, one does not find the remotest pressure of that sort.

*Chairman*

1635. Are you reasonably optimistic about the prospects over the next two or three years? We have Europe opening up in 1992. Your own company has made an alliance in Europe and you have reorganised your business here to compete with Europe. With the home market in defence and power generation the UK is becoming a more open market and Europe is becoming a more open market, though more slowly. In view of your recent tie ups do you think you will be better placed or less well placed competitively to take advantage of 1992 than you were five years ago?

(*Lord Weinstock*) The GEC is better placed than it was five years ago because having recognised, whether one liked it or not, that the single market was coming we tried to arrange matters to spread our activity into Europe, and a lot less than 50 per cent of our total business is now in the United Kingdom. The transaction that we did with CGE in Power Engineering, which covers power generation, railway systems, power distribution, boiler making and other things, exchanges for half of the French company Alsthom, a half of our business line; this involves considerable expansionary prospects for us. There are some fields in which the prospects are less good. If one takes power generation, it has not been a great help that the three coal-fired stations which we had won in competition will not now be built and that the nuclear programme has been abandoned. It is a big disappointment. We have lived for 17, 18 years on export business in power generation anyway and we will have to go on trying to win export orders to keep the jobs and our facilities going, but it does make things far more difficult when you have no home market.

1636. In your contacts with all the continental companies with whom you are now working more closely do you find the average management is up to your own standard, the same as or worse than?

(*Lord Weinstock*) In the case of what has become GEC Alsthom it is shared with some of ours and some of theirs. They have some very good people and so do we. We have some people who are less good, and I dare say they have too.

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LORD WEINSTOCK  
and DR STEVEN CUNDY

[Continued

[Chairman Contd]

1637. It has been reported that you hope to double their margins?

(*Lord Weinstock*) Well, yes, that is what we have to do. We have to get the whole thing more efficient. The pressure has to come from the top; it does not work the other way. When we come to our relationship with Siemens we find some of their people are first class; but some would not compare that favourably with our people. There are some types one comes across in continental European companies that we do not find here. These are young men who have experience in senior positions in the Civil Service, in France, for example, who have been Inspectors of Finance; they leave the Civil Service and go into industry and work as right hands to powerful industrial leaders. These fellows are extremely well educated, intelligent and imaginative. I do not think they would necessarily do well left on their own to run businesses, but they can help enormously in the process of making forward looking decisions, particularly about doing new things. I suspect that we must have people just as clever, but I imagine that they are all in the Treasury or the Foreign Office or have gone to the Bar or other professions.

*Lord Chorley*

1638. Or they end up in the City?

(*Lord Weinstock*) Well, yes, because it is so attractive and they earn so much.

*Lord Taylor of Gryfe*

1639. One of our witnesses pointed out that in the United Kingdom we spend 50 per cent of government funded research in the defence industry. The comparable figures were 26 per cent for Germany and 12 per cent for Japan, I recall, which suggests that many scientists and innovative people in the defence industry will now become less important. When I asked the Government whether they had any plans to make a smooth transition to non-defence contracts they said, no, that is the job of the companies. I suspect that you are one of the leading companies involved. Are you making a positive switch in research into civilian manufacture, beating swords into ploughshares?

(*Lord Weinstock*) I do not actually believe in this switching business. I do not think that what you do in defence and what you do in civilian products are necessarily interchangeable. There was a criticism in a report that appeared some time ago by some management consultants which indicated that the UK electronics industry was over-reliant on telecommunications and defence. Of course, that is an extraordinary thing to say. No one is in the "electronics business". "Electronics" is not a thing. Electronics is a technology. I have never seen an "electronic", no one has ever picked one up and showed me one. It is a technique used in making products for sale. The market we serve in the defence industry is the weapons market. That happens to be

largely electronics dependent. That is likely, as you say, to diminish. On the other hand, we make other things not in the defence field with electronics technology. We are facing a reduction in defence expenditure and we are under pressure to try to do more non-defence orientated business. One immediate result of a deliberate policy to do that, which we began four or five years ago, has been the low noise block in nearly all the Amstrad and BSB satellite receivers. Virtually every satellite receiver in this country uses electronic sub-systems developed by the Marconi company. We make for all these customers in competition with the Japanese, and beat them; and that work was done by people previously engaged in defence. That was the result of a deliberate decision to switch a team from defence to civil work. The reason for that was not that we knew peace would break out in 1990 but because for some reason—or maybe many reasons—it has always seemed to me that the engineers engaged on military projects are more ingenious than those who work in the civil field. They handle more sophisticated equipment. With weapons technology you define what you want done at the beginning, so an engineer knows what he has to do at the end. If you talk about applying that degree of ingenuity and intelligence to the civilian market you have to start from somewhere. Where is the specification of what you want? Someone has to think up what is possible. I do not see how it is possible to expect the Government to manage a change from military to civil production. There is no way they could do anything like that.

(*Dr Cundy*) At the research level, my Lord Chairman, there is very little to distinguish the two types of markets. The delineation of the two types of market tends to come at the development and certainly the manufacturing end. At the research level nearly everything that GEC is working on would have at least two or three applications in the civil and military markets.

*Lord Gregson*

1640. Is it not true that post-research to enter into the development stage far more money has been made available for military defence purposes than for civil type applications?

(*Lord Weinstock*) Yes.

*Chairman*

1641. Is that not one reason why the best people are attracted to that area?

(*Lord Weinstock*) No, I do not think so. The customer for weapons is the Government or maybe foreign governments. They spend what they spend on buying them. When one comes to deal with the civil applications of that sort of thing it is a completely different state of affairs.

1642. Dr Hilsum of GEC—

(*Lord Weinstock*) He is still there.



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LORD WEINSTOCK  
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[Continued

[Chairman Contd]

1643. —gave a lecture last October entitled, "Does industrial research pay?". He came to a rather qualified conclusion that on the whole it did.

(Lord Weinstock) I was very glad to see the qualification because you might have expected him not to make it. We have to do it; we have no alternative. The problem is to know what to choose to do. The question of how much can you afford to spend on research is the same as the "how long is a piece of string" question.

1644. He does a lot of international comparisons, and he mentions the high cost of money in the UK that Lord Vinson has pointed out. He is really making the point that you have handicaps in your research and in your innovatory programme that some of your international competitors, particularly in Japan, do not have.

(Lord Weinstock) We certainly do not have the advantages that they do, let me put it that way. I do not see how it is possible for anyone to say that we are handicapped in our research programme. There is no one to stop us doing any particular programme that we are prepared to pay for, but we do not get the same assistance as our competitors, that is a fact.

1645. But, if I may say so, you have been criticised in the past for not doing this, that and the other. The example of Philips, who went into certain things in a big way with rather disastrous results, must be present to your mind?

(Lord Weinstock) They are very nice people in Eindhoven and I am sorry for what has happened; it is a great company with enormous technological ability and I am very sorry that they have come down to where they have, but it is a direct consequence of insufficient financial control and an overweening bureaucracy with unlimited resources available to people who were talking about innovation.

1646. The Japanese companies have been much more closely focused in a way. As we said earlier, with a particular industry or particular product there has been great internal competition for the product. If you have a tremendous spread of electronics under one umbrella, it is difficult to establish priorities and to be competitive?

(Lord Weinstock) Yes, I think that is true. You cannot transpose the conditions from Japan to the United Kingdom and say they are comparable. There are many things about the environments of each that are not comparable. There is no cause and effect syndrome.

1647. All the evidence we have had is that the technical capabilities, the inventive capabilities and the basic research capabilities in this country are as good as anywhere else in the world. Translated into hardware that will sell competitively, however, we are held not to be as good as our competitors

(Lord Weinstock) Had we been able to preserve all the people we have trained, say, in the last 20 years I think one could say our capability for innovation would be greater—a great deal greater perhaps—than that of a lot of our competitors in the United States who have recruited British graduates for some of the most important things that have been done in telecommunications.

1648. Is that because we do not pay them enough?

(Lord Weinstock) We have not paid them enough, we have not given them enough respect, we have overtaxed them, we have hedged their lives about with restrictions and we have made things generally difficult for them. It was not a place where they could thrive in comparison with North America.

*Lord Taylor of Gryfe*

1649. Has anything been done to verify that statement that I have heard from time to time? Do we know specifically of British scientists in the United States? Is this hearsay or fact?

(Lord Weinstock) We know how many people have gone from the United Kingdom, say, to Westinghouse in the nuclear field and to Northern Telecommunications in the telecoms field. We know the excellent man who runs the General Electric gas turbine business, aeroplane engines, is an Englishman. There are a great many examples of this sort. It is not hearsay. One actually comes across these people. There is a youngish man, who told me he left the UK the day after he graduated from Imperial College. He ran Fairchild Semiconductors and when that was sold, he started up on his own. There are a great many examples of this sort.

1650. Tell me, are you getting all the people you need?

(Dr Cundy) Yes, we are in research laboratories.

(Lord Weinstock) We are getting something like 2,000 graduates a year in manufacturing. There are a lot of people we need that we cannot get with some scarce skills such as computer programmers, and microprocessor engineers. It is serious in some areas of business, especially with all the pressure to keep down wage increases. Employers do not normally rush around trying to give money away even to their own employees. Conditions in these fields of scarce skills in electronics and even in mechanical engineering require that we pay more money. The turnover in staff costs a lot more than paying the extra wages.

*Chairman*

1651. I know that GEC has quite close relationships with institutions of higher education and you have a very impressive record of training.

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LORD WEINSTOCK  
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[Continued

[Chairman Contd]

Do you think that industry as a whole or indeed your own company is doing enough to help universities and the technical colleges?

(Lord Weinstock) No, and we are trying to do more. We are setting up new training courses in our own institutions and we work with everybody else in the field. It is not enough, because we are short of people. One does not have to have an opinion; it is a fact that there are certain people we do not have whom we need. If we had them our output would go up, our profitability would rise and so on. One can say quite definitely, therefore, that the answer is no.

Lord Whaddon

1652. Lord Weinstock, I believe you said there was a haemorrhage of good graduates but that your own company managed to maintain an adequate stock of graduates. What do you do that others are not doing? Do you overpay them?

(Lord Weinstock) I did not say "haemorrhage". I said that if we had all the people in the United Kingdom who have gone abroad in the last 20 years we would have a much stronger stock here of skilled scientists and engineers. I am sure that is right. We do not get them coming in very often. When there is any movement they are usually going out. We educate them and then we lose them. That is not a good thing. The other question I was asked was whether we had enough people coming in as graduates. The answer to that is, yes, we have enough graduates, but they are not all good enough to make the grade to which they aspire and they do not all stay with us. We educate a lot of people who then go on and work for somebody else. If, for example, we employ 2,000 engineers and a small business down the road starts up and wants two, he can pay double the salary because he has to worry about two only; we have to worry about the rest of the 2,000. That sort of thing is going on all the time. A company like GEC necessarily makes a

contribution to the stock of skills in the country for use by other people. We do not do that because we want to but because there is no other way; we cannot avoid it. We are obliged to give this training to people. We send them to universities, as undergraduates and in sandwich courses and by all sorts of means, we train people, and a certain number of those people go off somewhere else.

Chairman

1653. Is there any final message that you would like to leave with us, Lord Weinstock?

(Lord Weinstock) There is just one thing, although I am perfectly certain that it is quite unnecessary for me to say this. I hope that the Committee will not come to the sort of general conclusion that has arisen out of some other bodies that there are one, two, three, four items that will provide a panacea and solve the problems. We have problems, and we have good features. We are always talking about the problems and ignoring the good features. Such problems as we have, like the good features, really are the result of historical evolution and a lot of things that have happened over a long time. There is not a way in which you wave a magic wand and all that is wrong comes right in five years.

1654. Your feeling is that the climate is more conducive to recognising the fundamental importance of business and innovation in business than ever before?

(Lord Weinstock) Yes. Dr Cundy says that the key word is "stability". If the importance of stability comes to be more recognised then maybe the importance of manufacturing industry will be a bit more recognised, but the recognition is still rather limited; there is not yet that much enthusiasm for industry.

Chairman] Lord Weinstock, may we thank you very much for replying to our questions so cogently.



*11 July 1990]**[Continued]***Memorandum by Lucas Engineering & Systems Ltd***Question 1*

Traditional structures have the following limitations:

- 1 Overemphasis on operations roles in manufacturing and neglect of manufacturing development
- 2 Inadequate numbers of generalist manufacturing systems engineers trained to professionally lead manufacturing innovation
- 3 Traditional fragmented specialist organisation structures inhibit team approaches and cross functional process management, in particular the multidisciplinary product introduction process
- 4 Manufacturing Systems Engineering not represented at senior levels in the organisation alongside product development
- 5 Inadequate effort on project management and matrix management to support Total Quality practices
- 6 Old-fashioned off-line training organisation structures which are not up-to-date with world's best practices

*Question 2*

Many companies are not sufficiently open to new ideas from outside and as a consequence of limited training of their managers and engineers coupled with traditional overspecialised engineering approaches are not well placed to look for and understand best practices, particularly the integrated set of methodologies and techniques practised in Japan. There is a tendency to look for standard panacea solutions, particularly those involving high technology equipment and computers and apply these unintelligently due to a lack of education in modern approaches. Managers visiting Japanese companies often do not know what to look for or understand what they see. The shortage of development resources and professional engineers devoted to manufacturing systems engineering development limits the capacity to adapt and apply.

*Question 3*

Traditional Production Engineering is overspecialised, has a narrow focus on the machine rather than the total manufacturing system and failed to meet the Japanese challenge. There should be two clear roles alongside the Product development role.

- (a) Industrial Engineering—Operational Engineering
- (b) Manufacturing Systems Engineering—Development Engineering

The former supports continuous improvement and the achievement of short-term targets and the latter provides a fundamental medium- to long-term development capability.

*Question 4*

Government departments are becoming better at providing an educational and enabling framework for manufacturing innovation as distinct from merely providing grants for automated machinery for badly designed factories operating traditional organisational practices.

The DES should give very visible PR support and special treatment for degree and HND courses in Manufacturing Systems Engineering to improve the balance of output.

*Question 5*

City attitudes clearly have an influence of the longer-term development attitudes of Japanese companies and the low rate of return on sales they accept in Japan.

*Question 6*

There is nothing specially inhibiting except perhaps that R&D in manufacturing systems engineering requires a wider definition to allow methodologies such as the Toyota Production System, Design for Manufacture, Total Quality, etc., to be embraced by it. Also training should be encouraged by tax allowances.

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*Question 7*

One very notable omission is the availability of high quality Engineering (i.e., as distinct from traditional science or engineering science) PhD programmes such as have been developed in the German technological University Institutes and Fraunhofer Institutes, e.g., at Aachen the Manufacturing Engineering Institute has over 100 Dr Ing candidates being trained via broad real engineering programmes which also develop good personal skills who then transfer technology "on-the-hoof". In the UK the output is too small and overspecialised with a pure science culture.

*Question 8*

Yes—but the UK is still learning how to run collaborative team programmes and how to link the work closer to applications.

*Question 9*

Few companies have structured supplier development programmes for transferring manufacturing systems engineering approaches supported by good training programmes for smaller suppliers.

*Question 10*

Availability of engineers, proximity to customers and markets, operating costs, facility for accessing earnings, availability of a professional supporting infrastructure.

*Question 11*

There is still room for improvement in the installation of vigorous and effective project mechanisms.

*Dr J. Parnaby*  
*Group Director—Technology*

28 March 1990

**Examination of Witnesses**

DR J PARNABY, Group Director, Technology, Lucas Engineering and Systems Ltd, and DR J GARSIDE, Manufacturing Systems Engineering Executive, Lucas Aerospace, Lucas Industries plc, called in and examined.

*Chairman*

1655. Dr Parnaby, thank you for coming and for your memorandum on general principles about what makes a good innovatory company. There is one point first: I take it that Lucas fulfils all the requirements that you there set out?

(*Dr Parnaby*) My Lord Chairman, we have made a note of the principles in regard to the last five or six years, but I must say that we are by no means faultless and we have a lot to do still. We are about halfway towards where we are heading.

*Lord Chorley*

1656. Is the other half of that doing new sorts of things or completing the old ones?

(*Dr Parnaby*) It is a combination of the two, my Lord Chairman. I do not know how familiar you are with what we have been doing, but we have worked hard at acquiring world's best practice. We have been looking to learn from outside. We have learnt a good deal from the Japanese. They have been very professional about this. We have blended that with our own skills and we have tackled the regeneration and restructuring of Lucas in an intelligent way. Each business is different. While there are variations, the common theme is pretty constant.

1657. Have there been any organisational changes? A number of witnesses have said that one gets a more innovatory culture if one has a flat structure rather than a command structure.

(*Dr Parnaby*) Very much so. Organisational changes have started on the macro scale by portfolio restructuring, that is, the selling off of those areas in which we could not compete, the selling off of commodity type businesses and so on. That is one organisational architectural theme. Underneath that we have been working through a typical business unit in a way that reduces the number of departments at the same time reducing fragmentation and eliminating work complexity, taking out layers and levels and so on. We call them cellular groupings of people. This leads to cellular manufacturing and team-based manufacturing systems and, in the new product development area, building teams around problems rather than sending problems in chain reactions to functional departments. The key is organisational change. Many of the new techniques and technologies are useless in a relative sense until you have done that: first, change the organisation, simplify, take out waste, then automate last so that you do not waste any money.



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DR J PARNABY  
and DR J GARSIDE

[Continued

[Lord Chorley Contd]

1658. Have you learnt from any other companies in Japan?

(Dr Parnaby) We have learnt from all sorts of companies. We look for best practice wherever it is. When we were looking at our distribution systems we looked at Volvo's new concept programme. We looked at Boots the chemist. We reckoned that anybody who could keep shops full of goods with an average selling price of just over three pounds must be quite good at that. We looked at America in respect of competitiveness in aerospace manufacturing. We looked at Germany in respect of basic engineering skills, disciplines and education. We looked at Japan as being the only manufacturing nation that put the whole act together.

Lord Vinson

1659. There is one outcome we are hoping for from the Committee's inquiry although one cannot change the national culture, of course, as Lord Weinstock was saying earlier, which is an inhibiting factor in our poor record in the development of marketing new technology, although we are often good at getting the technology in the first place. I should like to explore with you financial constraints. In the memorandum you mention that the Japanese particularly have much lower rates of return. The tax structure and tax allowances, the amortisation levels that the tax structure allows, are things that can be changed quite quickly.

(Dr Parnaby) Yes.

1660. Would you say that existing levels of amortisation of plant, that is, 25 per cent diminishing balance, encourage replacement of plant by modern innovative ideas or tend to retard the replacing of that plant because effectively it is not written off until six or seven years, and even then it is nowhere near written off at a rate in an inflationary period that covers its true replacement cost? While I am not saying, my Lord Chairman, that this will transform the world overnight, it is something that could be changed fairly quickly if the Government saw its way to do it?

(Dr Parnaby) What you describe obviously is an impediment to progress, but there again one has to get a return on the money invested. This is the difficulty. What you said about changing the system clearly would be helpful. There is no dispute about that. However, when we redesign a business unit, what we find is that we often throw away up to 20 per cent of the machinery because of improved effectiveness. If you work out the capital turnover ratios for the west versus the east you will find that they are in fact working with less plant than we are. That is why I said earlier that our approach in restructuring what we do is to simplify current organisational approaches. At the end of that process you then invest in the right equipment but you do not throw money at it blindly in the panacea

sense. In relaxing any constraints in respect of capital therefore you have to be very careful not to indulge in amateur investment processes.

(Dr Garside) What we have found, particularly in Lucas Aerospace UK, is that we have to do the simplification and then, once we have gone down the simplification route, we can then focus on the core pieces of equipment that we need to manufacture the products as a key to our specific business. However, until you have gone through the simplification and until you have gone through the restructuring of the business we could have spent an awful lot of money on new capital plant that would not have provided us with an economic result for our sort of products.

1661. I take that point absolutely. For example, three shifts instead of one shift will get a better capital utilisation so that the framework in which you operate might be right.

(Dr Garside) Yes.

1662. You have said all that?

(Dr Garside) We have said all that.

1663. Now you have the new slick "with it" set-up, then it would be helpful to you if you were able to amortise those costs more quickly?

(Dr Garside) It would indeed.

1664. Therefore, you could get back into the next lot?

(Dr Garside) Absolutely.

1665. I cannot believe that a 25 per cent diminishing balance anywhere near adequately allows you to recover the cost of any replacement, quite apart from anything else.

(Dr Garside) No.

1666. I should be interested in your views as to whether that might be a beneficial change, although it will not solve it?

(Dr Parnaby) It would be a beneficial change, my Lord Chairman, yes. We have a case study which illustrates the way in which we have been doing these things. It is a five to seven year process in which we progressively redesigned or re-examined all business units. There is a one to two year deadtime where you do not see any results. Then progressively you see an improvement in all performance ratios. We have taken the liberty of bringing along a study of Lucas Aerospace UK, which is our United Kingdom aerospace business. Some of the features about which you are asking are described very adequately therein, including the capital investment profile.

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DR J PARNABY  
and DR J GARSIDE

[Continued

*Lord Chorley*

1667. What would be your reaction if the Inland Revenue said: you can have any tax rate depreciation you want provided that you use it in your public accounts?

(*Dr Parnaby*) I should really need to talk to our finance director about that, my Lord Chairman. I am just a straightforward engineer, as they say. I could not see any problem with that personally. What we have to do is to guard ourselves against people who are not doing the right things. That is the problem. It is protection from the amateur. We want a professional approach.

*Chairman*

1668. With regard to your submission in respect of your financial record, it is of a company that has gone right down and then made a spectacular recovery in the last few years through restructuring?

(*Dr Parnaby*) Yes.

1669. If one goes back 25 years, Lucas had quite a name in the Midlands for quality service. You used to run seminars on how to run a business economically to get the best possible quality. What went wrong, Dr Parnaby?

(*Dr Garside*) I have a document that was published in 1950 that covers many of the aspects of what we are trying to do today in manufacturing. The thing that we forgot somewhere along the line, I think, is that if you are going to get effective factories you have to design them. You have got to have people in the organisation who are responsible for designing how the factory is going to work.

1670. You have had very antique factories?

(*Dr Garside*) We have had an awful lot, yes, my Lord Chairman.

(*Dr Parnaby*) I can perhaps explain this. Like many British companies Lucas used to be a high volume low variety business, but progressively world competition coming at us claimed our niches. Therefore, we had progressively to increase the variety of what we made. The older manufacturing systems could not handle that. They then grew piecemeal and became over-complicated. In that situation, to try to introduce Quality Circles when you are not organised into team based structures is a waste of time. The key in the Japanese approach—and that is why we call it systems engineering—is that you have to do many things simultaneously. We now have many Quality Circles. We call them continuous improvement groups and other names. They are growing out of the cellular structure, which has been properly designed as a system. However, all this takes time. I do not know whether your Lordships can see clearly the line of this graph.<sup>1</sup> It starts in 1986. You see January 1990. It shows a two

year flat spot where we are doing all the basic work of redesign, simplification and so on of all our UK divisions. This is a tremendous load—task forces properly trained, and we have a whole continuous education training programme—much effort with no return. It was quite difficult: people were saying, these teams have been running for two weeks now, have they produced anything. Then, after three weeks, “We should close them down—there are not results”. For nearly two years virtually therefore there was this flat spot. Then, progressively, you see the total number of employees reducing steadily as the work starts to take effect.

(*Dr Garside*) The key about those employees, my Lord Chairman, was that it was not the direct worker who was being removed; it was the indirects and the staff people, whose job roles we could not define.

(*Dr Parnaby*) If you follow that through, there was the flat spot problem, 1985 to 1987, and you see the total employees going down. If you look next at sales per employee,<sup>2</sup> you see it is flat first, then up it goes as one now had these new organisational structures, that is, team based structures and new manufacturing systems.

*Lord Vinson*

1671. If you corrected that for inflation how would it look then?

(*Dr Parnaby*) We have corrected for inflation, in fact.

*Chairman*

1672. Who were the dynamic people who did this, Dr Parnaby? Did it come from the top? Were the people who did it already in the company?

(*Dr Garside*) You need somebody in the organisation who actually believes that we have to change the business. You have to set yourself some very severe targets. What we do in Lucas is to have something that we call a competitiveness achievement plan.

1673. Who said, we must change the business?

(*Dr Parnaby*) It was Tony Gill. It started with the leadership. We happened to have a chairman who is an able engineer. He saw the need for change. He recruited people like me and John Garside. We are change agents; although I am director of technology for Lucas Industries my job is change and innovation development, that is, helping people change. We worked through people in the business. We have brought in a lot of young engineering graduates and manufacturing systems engineers. We have put them in a special company that provides support to the change process, but they join other people's teams and those teams are comprised of people already in the business. We get up executive management workshops. We train the management

<sup>1</sup>See graph of Total Employees, page 282.

<sup>2</sup>See page 283.



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[Continued

[Chairman Contd]

team, we train the task forces, we provide graduate engineers in each task force and then we just leave them to the process of change.

1674. The previous management had good intentions but they had not analysed the business?

(Dr Parnaby) It is not just that, my Lord Chairman. It is educational background, it is amateurism, it is not enough engineers.

1675. When did you join?

(Dr Parnaby) I joined Lucas in 1983.

(Dr Garside) I joined in 1986.

1676. Where were you before?

(Dr Parnaby) I was in various places: I worked in textile machinery, I was a university professor in manufacturing systems engineering, I was in the steel industry and I was in the chemical industry.

(Dr Garside) I had a Courtaulds scholarship to go back to university. I then went to Sperry Vickers, then Dunlop—various jobs there—then I went to GKN Technology to learn about metal processing; I joined Lucas with CAV, I had two years with CAV, and in the last three years I have been with Lucas Aerospace.

1677. You brought a lot of diverse experience to bear?

(Dr Parnaby) Yes, it is the generalist engineering view, you see, which is one of my personal hobby horses. It is very important. We also invest in a lot of training in Lucas, and we have a continuing education training programme. We have a massive open learning programme. Most of the key modules in it we have developed ourselves from studies of world's best practice. This is because one could not get them out of the educational system; the educational system is backward. We put all that together with a project team approach, which we sometimes call total quality programmes. When you have done that, you have put alongside the operational jobs in the business a very strong development mechanism. That development mechanism designs and drives the change. However, it requires top down direction, which comes from our chairman.

Lord Chorley

1678. How much of this is relevant to the training of engineers at universities and polytechnics?

(Dr Parnaby) Very relevant.

1679. Are they picking up the message? You came from an academic, a university, background?

(Dr Parnaby) Yes, I was the first UK professor of manufacturing systems engineering. I came out of the chemical industry and chose the title myself.

1680. Are other university engineering departments catching on?

(Dr Parnaby) There are 12 Lucas professors of manufacturing systems engineering, including Professor Bhattacharyya, for example. There is one Lucas professor of business systems engineering, there is one professor of aerospace systems engineering and one professor of electronics.

Chairman

1681. To what extent is Professor Bhattacharyya in his work doing the sort of things that you think should be done?

(Dr Parnaby) We have helped Professor Bhattacharyya create a framework for industry to use for off-line training of its employees. We were one of the initiators of the integrated graduate development programme. He is very helpful. He has created a framework as an academic innovator for industry to get the right things taught. We provide lecturers and we provide material. It is a very good arrangement.

Lord Clitheroe

1682. What caused the initiative of this major innovation within Lucas, because it is a total innovation of management? Was it because of the extremely cold water of 1980s, which left Lucas in a difficult situation? Was it because new people started appearing? What caused the decision?

(Dr Parnaby) People were aware that things were getting worse. The situation was incrementally getting worse. In that sense people were trying to combat the change by piecemeal innovation. Round about 1980 to 1981 it got catastrophically worse. In my book as a change agent that is a significant emotional event; change agents build on the back of significant emotional events. Our chairman, watching all this, understood that new ideas and new methodologies were required. He therefore took advantage of that. Although he was concerned about it, he started creating change. We decided that you could not go for a panacea just buying lots of computers and lots of high technology machinery but it would have to be educational innovation. That was the root of it.

1683. So that the process which caused some companies to die caused you to revive?

(Dr Garside) Yes. The other thing at which we have to look, I think, is identifying what your critical success factors are: if you are to succeed, what do you actually have to do to succeed in world markets. It starts with that analysis, then everything else can grow. Until you have started to identify where you are vis-a-vis world competition and what you have to do to compete you cannot start and put the plans together that enable you to get there. There has to be a major thrust into the market identifying what is

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[Continued

[Lord Clitheroe *Contd*]

required. We try to make sure that every innovative team will produce an end result in a key business area that can be monitored.

*Lord Chorley*

1684. You are saying in a sense that there is a pretty heavy two-year investment in getting it through and getting people trained? In that period I suppose you are rather vulnerable to predators and so on? Is that a worry?

(*Dr Parnaby*) It has been from time to time. It needs courage. Our chairman has the view that he is going for long-term stability. We are not a "Sock Shop". Yesterday's glamour is today's sinking star. We are in an engineering business of which we are proud. It is a very competitive business. As Lord Weinstock said, there are no quick magic wands. You have got to put in the groundwork and stick with it and you have got to keep on giving good explanations to people looking for quick results in order to hold off the people who want to stop you from doing whatever it is you are wanting to do. It is quite hard work. When you are changing a culture you are bringing quite a lot of people along with you. We have shed something like 30,000 people as well.

1685. But were you worried about predators in that two-year period?

(*Dr Parnaby*) Oh, obviously, yes.

*Chairman*

1686. Did you talk to City analysts?

(*Dr Parnaby*) Often, yes.

1687. You made a point of keeping them in touch with what you were doing?

(*Dr Parnaby*) Our chairman and our finance director maintain a very good interface with the City and with the analysts and involved me a good deal. I am often meeting them and giving them presentations and telling them about the methodology that we are using. In the change process one of the most fundamental requirements is good communications, whether in factories, in offices or between yourself and the City. You have to work at that. It is quite fundamental.

*Lord Taylor of Gryfe*

1688. You said that the City responded and did not necessarily take what is called a short-term view that the company was not doing very well and you had to convince the shareholders it would need two or three years of poor return until you got off your mark so that the City in this case was fairly supportive?

(*Dr Parnaby*) It depends obviously on who "the City" are.

1689. A look at your shareholders tells you largely who the City are, largely institutional?

(*Dr Parnaby*) At the time we were going through the process most engineering businesses were in the problem we were in. We went only slightly into the red in one year. We had generally been profitable throughout all that process. It was a question of people staying with us because they saw that long-term we knew where we were going.

1690. I was impressed by the continued reference in the submission to Japanese experience. You are obviously a great Japanese fan. You heard Lord Weinstock, who took the view it is difficult in a changing and different climate and culture to transfer Japanese ideas wholly into a British situation. That is not exactly the experience of Japanese companies that have invested in this country?

(*Dr Parnaby*) And it is not our experience.

1691. You are a major supplier to the car industry obviously.

With the Japanese car industry in this country are your company stimulated into greater quality awareness in supplying them? What has been the impact?

(*Dr Parnaby*) No more than, say, Ford. Ford are excellent customers. They articulate what they would like. They work with us. They set a framework to their process. They are excellent customers to deal with. In regard to the basic point of whether the culture is transferable, let me say that culture can be changed by education and training. That is my view. You have to work it out. I can show you Lucas factories that are pure Japanese—if you call "Japanese" the collection of world's best practice which they have borrowed from other people and refined. What we have been looking at is not culture; it is professionalism. It is businesses with a lot of engineers, well-trained engineers, working as a team, putting manufacturing first, getting the base of the business right and then building on it. If you analyse what they do and then translate that into training courses you can start training the people. It takes time. There is cynicism and people have to see success. You have to choose your targets carefully. We have put a lot of effort into internal seminars. We have internal experience report documents circulated. We have training programmes. Progressively, as people get to understand the new methods and see it as professionalism, you start achieving a Japanese methodology.

(*Dr Garside*) The other key factor is that you have got to put in the resource that now starts to address the problem of how you design the factory or the overhead structure to be effective. If you are to go into a lot of factories and say, who is responsible for designing the product, they will point you to the design office and it might be 100 people strong. If you then ask who is responsible for designing how the product is manufactured, the person who is going to think through the materials flow, the skill requirements, the machinery, the total



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[Continued

[Lord Taylor of Gryfe *Contd*]

of how it is going to work, you cannot find him. You can in Lucas factories now. A lot of industry still does not resource this vital job of how you design manufacturing. If you look back to the Japanese, one of their successes was that they came and licensed our products; they took the very product that we were making and they put all their energy into how to design to manufacture it, how to design to improve the quality, how to remove the cost from the product, and then they came and sold the same products back to us and we have bought them. That really is the key. It is getting that resource.

(*Dr Parnaby*) You can write it down, you can analyse, you can understand and you can train people in the methods. If you redesign the factory systems with new methods and materials flow, new process changeover practices, ability to handle variety, economy of scale by putting many varieties through one system, you finish up with a simple requirement and you can then start with the office areas and all the support and paperwork and overhead staff and you can start simplification and cleaning those out. That is where you really start to get the sales per employee moving.

Lord Vinson

1692. This is management innovation to turn a concept, a basically good idea, into a highly sellable product. What do you do about trying to spot those products in the first place and are you frustrated in the development of them by cash or the lack of ideas or by production facilities or what?

(*Dr Parnaby*) We are never short of cash for a good idea. We never turn down a good capital investment request. In Lucas in supporting innovation in every respect we have talked primarily about management change, development in personnel functions and manufacturing systems and so on. We have also, however, quite an infrastructure in technology. I run a group technology council covering the whole of Lucas. Underneath that we have a manufacturing development steering committee, an information technology development committee, a computer aided engineering development committee, a quality engineering techniques committee and a mesh of supporting structures. This year we have just gone through the process of filtering out all the ideas, debating them and knocking them into shape in order to try to plan next year's programme. We have a very good system for making sure that we are pushing all technologies and all methodologies at a rate that we can in fact handle and get them in the right place.

1693. As a supplementary to that let me ask you this. Occasionally comes along an idea where first market research and secondly hunch makes you think it is a world beater. It will mean setting up a greenfield operation after a small, trial run to get the thing hard and to sell it. To what extent do you do that or develop that technique?

(*Dr Parnaby*) We put a good deal of effort into marketing. Every senior manager in Lucas in the last two years has been on a very intensive marketing programme. Our chairman has been driving a whole process of marketing in education and training through the system. That links in directly to definition of strategic targets, which supports what we call a competitiveness achievement programme. Every business in Lucas has to have a competitiveness achievement programme which has been approved by its managing director. In front of that is this whole market analysis of research. We have a couple of programmes coming through right now of exactly the category you are talking about.

1694. New ideas?

(*Dr Garside*) In our aerospace sector we have slightly different problems. We have been used traditionally to the major airframe manufacturers and aeroplane builders or engine builders providing us with a fair amount of our non-recurring expenses for doing the technical development. What we now see emerging is that the major engine manufacturers are no longer willing to pay the non-recurring expenses. That means we have now to start to fund that development ourselves. What we are now saying is that the risk in these programmes should be shared if our technology is ahead of that of Boeing and McDonald Douglas. If we want to join in the McDonald Douglas MD12 programme we have to fund the development turnover of that division for a year. There is a certain limit to how much we can invest and which programmes we are going to join. We are having to think on a world-wide basis. It is a change of scene.

Lord Taylor of Gryfe

1695. Let me ask you about your involvement in the defence industry, which is large. Some years ago I seem to recall your shop stewards anticipated the decline of defence spending and set up a study group to see how the direction of your company could be changed. I thought that was innovative, coming from the shop stewards, to make you a better civil market?

(*Dr Parnaby*) We have been working on this for years. We are very much dominated by civil business in our aerospace businesses. Defence is now less than 40 per cent, I think, if I remember rightly.

(*Dr Garside*) In 1991 we will be down to less than 40 per cent of sales from military business.

(*Dr Parnaby*) It is going down. It takes several years of course before it works out of the system. We have been planning it for quite a long time. Within that we have problems with certain step changes like the recent Tornado exercise. We got ourselves into a position with the replacement product programmes coming along, then suddenly there is a step change and demand is cut at a time when we have just put all the basic technologies together so that together with other British companies we can do a super job. That instability hitting the system is likely to cause



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[Continued

[Lord Taylor of Gryfe *Contd*]

a few hiccups in some areas. We would like to see if possible nationally managing these in a more gradual way rather than a sudden step.

(*Dr Garside*) I have a factory in Netherton, Liverpool, that has done everything you could have asked of it in the way of retraining people, going to cellular structures, making itself flexible. It makes the constant speed drive for Tornado. I knew I had a three year change programme to move away from the military business. Now, however, with the cutting of batch 8 and a question mark over some of batch 7 even, unless I have a new product to put into that business by April next year, we may have to close it.

1696. You are working on that hard?

(*Dr Garside*) I am working on it very hard, yes. We have the skills there, we have the machinery there and we have now to find ways of making that factory keep in business. It is a Japanese type factory.

(*Dr Parnaby*) It has done all the things I have described. We were working our way steadily through that. It is not that I am suggesting it is not our responsibility to do that; it is just that the sudden shock change that arrived we would like to see spread over another year or two and a half years.

*Lord Clitheroe*

1697. May I couple that with the earlier question on what Government can do in general. Would you endorse Lord Weinstock's view that the main thing Government could do is avoid too much change of background to enable you to do your own thing? Alternatively, do you see it as Government's business to do something to improve your ability to innovate?

(*Dr Parnaby*) I think that stability or gradual change is very important, if that could be managed. It gives industry time to regroup. That is one issue. It is not acceptable at the moment to talk about national manufacturing strategies. That is because there is a misunderstanding of what might be meant by that. The way we work achieving a national manufacturing strategy is a team job. There is the micro scale of every business having a manufacturing strategy, which is a mix of machines, processes and people; above that level it is a team job, and there are things that Government can do. For example, in the United Kingdom now between ourselves and other aerospace companies over the last few years we have developed quite a unique set of technologies that together could create a whole aircraft. I see Government having a part to play in a national manufacturing strategy framework without that being misinterpreted as Government defining a national manufacturing strategy, that is, a team player in the whole approach but not taking up industry's responsibility of the detail of a manufacturing strategy. As an ardent student of Japan I suspect (we do not quite understand how the

Japanese do it) that there is a whole jigsaw there, the roles are very clear and it is a supportive role and it is a team job.

(*Dr Garside*) We know that the Japanese want to enter the aerospace business. Here we are in the United Kingdom: we are sat on every piece of technology for a new aircraft at this moment—something like a replacement for the 737, which has been in production for a long time—and you just feel that if we had a strategy that said we should be co-ordinating those technologies it could replace a lot of the work that we are going to lose because of the rundown of our military business.

*Chairman*

1698. Talking of Lucas' work in defence and aerospace, although it has been a great success story, your total sales have been static in real terms for the last 11 years?

(*Dr Garside*) We showed some increase in sales in the United Kingdom: we have gone from £240 million in 1986 to £310 million in 1990, but we have not managed the organic growth that we should like to have seen in that period.

1699. I am talking of total sales, which have gone up from £1,136 in 1979 to £2,187 in 1989, and in real terms that is a slight decline?

(*Dr Parnaby*) We have divested ourselves of a lot of companies. We have shed the whole of Lucas Electrical. That has gone. We have been acquiring, but we have been restructuring the company.

1700. Shut them down?

(*Dr Parnaby*) Sold them off in general; we have closed down some units, something like 20 factories. Generally speaking we have sold off peripheral businesses in order to start concentrating increasingly on high technology core businesses.

(*Dr Garside*) We have got to get on to world programmes, we have got to invest now, particularly in the aerospace business. We have got to go and invest money and share some of the risk on some major world programmes. That is the only way in which we will get the growth.

1701. It is almost as if your real job is just beginning?

(*Dr Garside*) Oh, yes; we have redesigned our factories. We are now profitable. Our margins have gone up quite well over the last three years. We are now generating cash. Now we have got to use that cash first in new technology and new equipment that enables us to continue generating the funds; and secondly, to get teams of people together so that we can hit the new products that the world demands in the next ten years.

(*Dr Parnaby*) I guess what we have been doing, my Lord Chairman, is getting ourselves fighting fit, but not neglecting the market place. We have been



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[Continued

[Chairman Contd]

creating manufacturing systems that are now manageable by real people backed up by the sort of training programmes that we have. We are going to be well placed, there is no question of that.

Lord Taylor of Gryfe] I am not fascinated by sales—anyone can achieve that—but your profit before tax is very impressive.

Chairman

1702. I accept all that. It seems to me Dr Parnaby has confirmed you are getting yourselves into a competitive situation for the 1990s which you could not have done before?

(Dr Garside) We feel that we are in a position to compete. As to whether we will succeed, our actuation division in Wolverhampton recognises that it will have to move into civil actuation much earlier than some of our other businesses.

1703. You mentioned institutes overseas—the German technological university institutes and Fraunhofer institutes. Do you recruit anyone from these or from the continent at all?

(Dr Parnaby) We have German companies, French companies, Spanish companies, and there is a fair amount of interchange. In general no; it is very difficult to tempt a German engineer graduate to come and work in Britain.

1704. Why—is the pay too low?

(Dr Parnaby) The pay is much better than it was. It still is not good enough. We have done a lot in that respect. It is a lot to do with the infrastructure. A German engineer has come through a very different education process. He is not a scientist, he is not a physicist disguised as an engineer. He goes through a very broadly based engineering training, he takes a broad A-level course, he does not take this silly three subject thing we are hung up on in England. (The Scots have it right, I think.) He then does his doctorate in real engineering. He sees an industry that is staffed by those sorts of people. It is self-perpetuating. What we have been doing in Lucas is to recruit good talent, bringing them in. I have one unit reports to me, Lucas Engineering and Systems, which has 450 professionals, young people, 27, 28 years old, who have been brought in, put through the training programme I have described, fitted into the change processes, they can work everywhere in the world and they are now feeding through into junior management and some of them are getting into senior management. We are now building up an infrastructure that makes our sort of business more attractive to that sort of talent. That is quite critical. Young engineers coming out of university will judge opportunities in the environment they see them in. A German engineer with an engineering doctorate, *not* a science doctorate sees a very respectable opportunity, he sees industry staffed by the sort of people that he is and he sees the sort of leadership that he is looking for. We are getting there, we are a long way up that route.

(Dr Garside) If you look at aerospace in particular, the Tornado programme, the EFA programme, the airbus programme, all require collaborative partners in Europe. Therefore, we have quite a lot of experience now putting teams of design and manufacturing engineers together to work on collaborative engineering developments. We have now to take a much broader view of the engineers available to us in Europe. I think particularly in my part of the business the United Kingdom has in fact led especially Germany in the area of aerospace manufacturing.

1705. Are you losing people to other companies? Lord Weinstock mentioned that he is almost a training ground for other companies.

(Dr Parnaby) Not like we used to do. We have introduced what we call scarce skills job structures, which carry with them scarce skills salary payments. We then have the project team approach, which gives young people a tremendous challenge. I have had 26 year olds who since they joined Lucas five years ago—let me take one guy as an example. He has worked in Newcastle under Lyme for six months, he has worked in Ohio, he then worked in an aerospace unit in Paris and he is currently working in Gillingham installing a project management process. Offering that sort of challenge in a project team working to deadlines where literally you work the pants off them and they love it is a way of keeping them because that is exactly what they are looking for.

1706. We have heard of young engineers getting turned off by not being given enough responsibility soon enough?

(Dr Parnaby) Yes, this is why the question of organisational structure is so important. Traditional industrial structures represent the education process—specialised A levels, specialised degree, specialised functional department and stay there for ten years to be told you are not general manager material. The Japanese approach, which is cross functional training, broader groups, project team activity, develops people much better. That is why it is so critical.

Lord Clitheroe] It is not just the education process here. It applies all through society. You get in the Civil Service, you do not get out of it. You get in industry, you do not get out of it.

Chairman

1707. You have given us some quite exhilarating evidence and we are very grateful. As to your general conclusion, is your feeling that the general standard in this country of people you serve as suppliers and from whom you buy is going up?

(Dr Parnaby) It is very patchy. We have worked very hard to get halfway there. Quite a lot of people have not started. Some people have done significantly better than we have.

*11 July 1990]*DR J PARNABY  
and DR J GARSIDE*[Continued]**[Chairman Contd]*

1708. What would make them start?

*(Dr Parnaby)* The problem is the smaller companies. Because of synergy in Lucas we have been able to pool resources and provide training and education and train people. A small company cannot even provide a project manager very often. We have to find ways of helping the small and medium companies. We do it: we have what we call supplier development programmes. However, there is a limit to the resources that we can come up with. You can do it in a number of ways. If you take national research programmes the idea would be to have a big company provide the project management for the small companies to shelter underneath without having to provide a lot of resource. Government enabling frameworks could be oriented towards the smaller companies, perhaps channelled through their major customers so you get commercial clout, not exactly threatening, but good

incentive to accept government enabling help in order that you can meet your customer requirements. It is very difficult to make that happen through normal commercial pressures. If you overdo that you finish up closing down a supplier. Nobody wants that. We want a good supplier base. The challenge is how to integrate the small and medium companies into the innovation programme and make sure it is not amateur but they are properly trained and help is given.

1709. You made clear that a lot of the motivation for change came from the top. What is the professional background of your chairman?

*(Dr Parnaby)* He is an engineer. He is a very able guy, an excellent guy to work for.

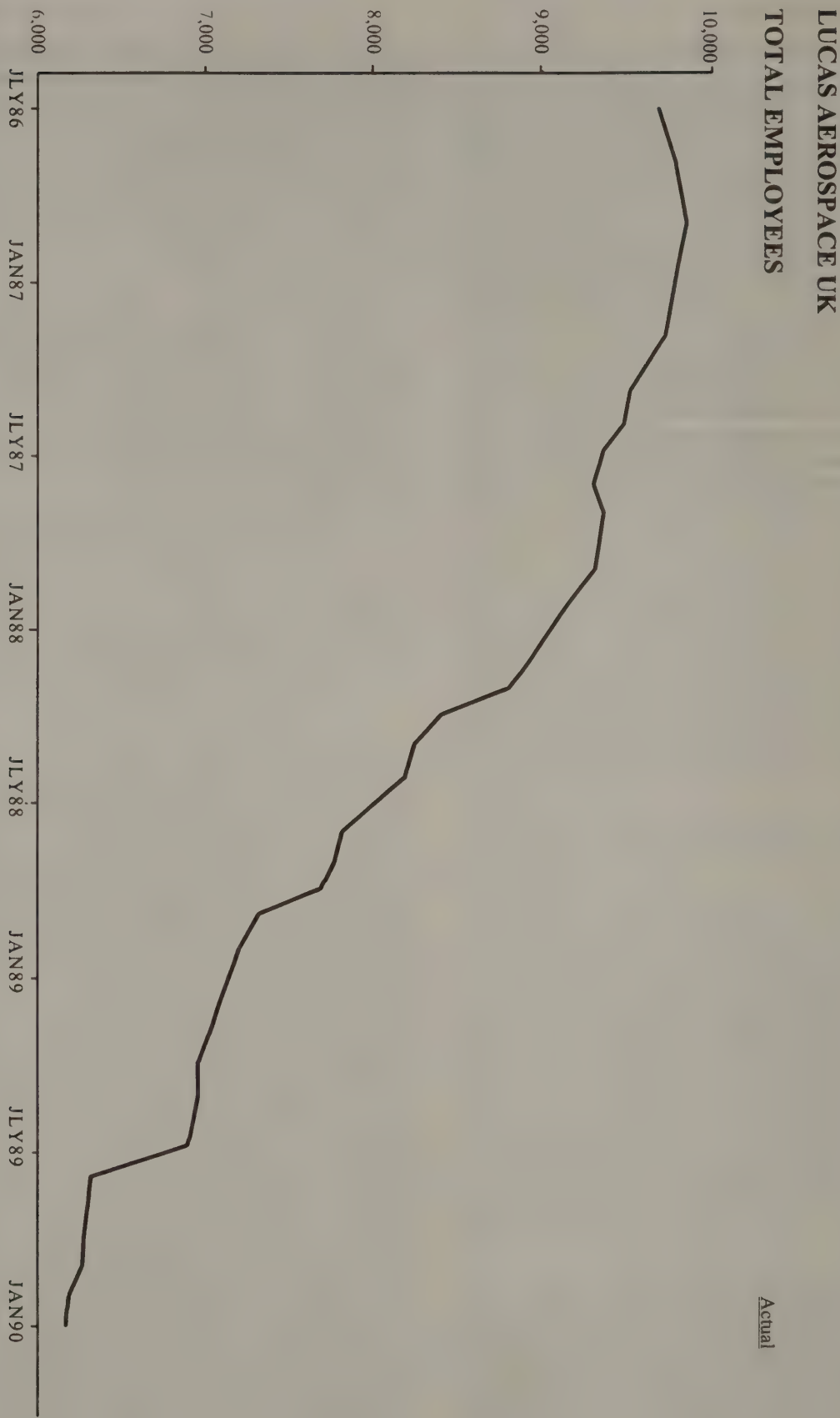
Chairman] That is very interesting. Thank you very much indeed.



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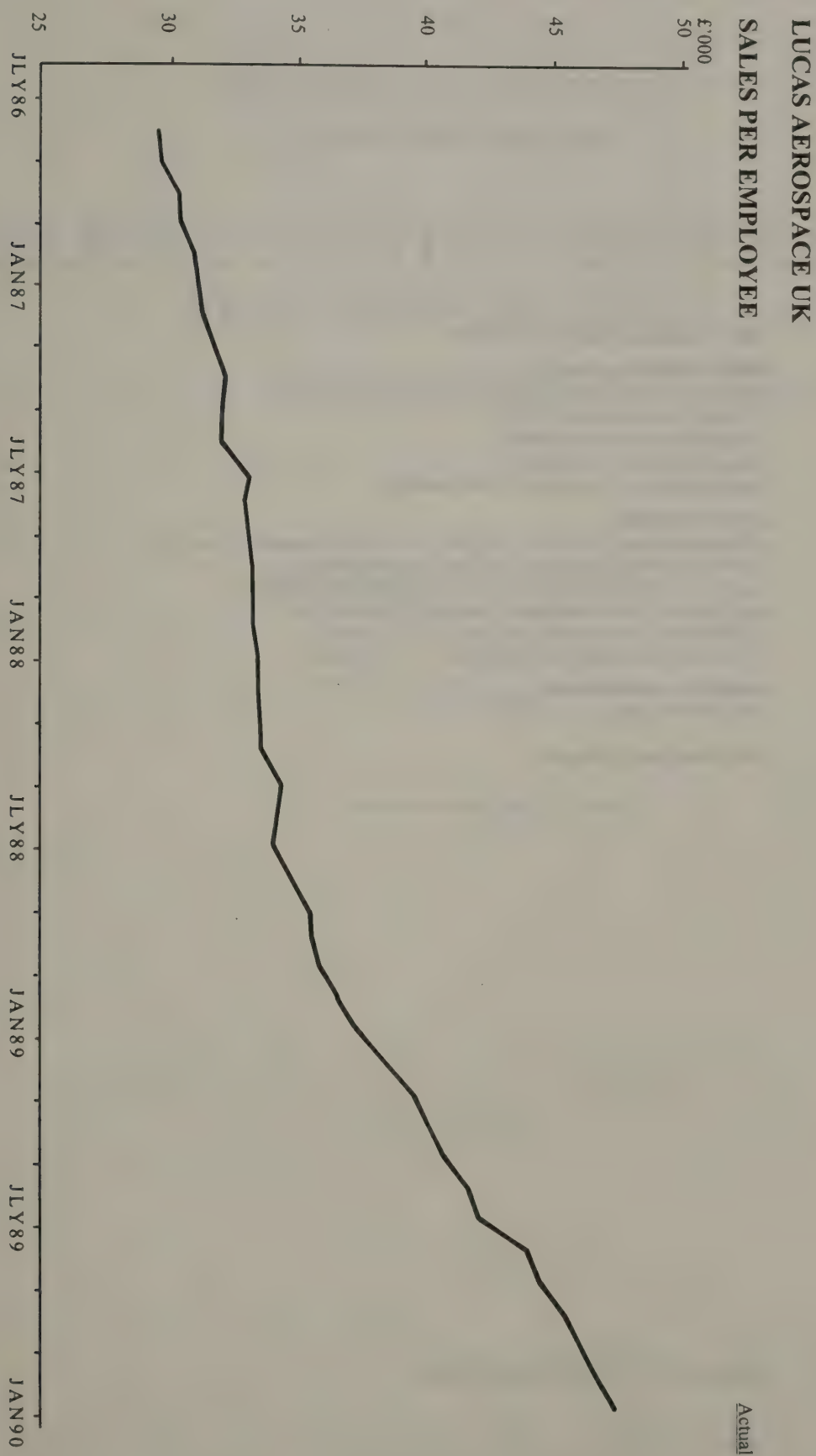
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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 18 July 1990

*Sir Geoffrey Allen*

*Mr F D Rosenkranz and Mr N Dennis*

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WEDNESDAY 18 JULY 1990

Present:

Caldecote, V (Chairman)	Kearton, L
Erroll of Hale, L	Taylor of Gryfe, L
Flowers, L	Whaddon, L
Gregson, L	

**Letter from Sir Geoffrey Allen**

The replies to the eleven questions on Innovation in Manufacturing Industry, taken in order are:

1. Company attitudes and structures are of payments importance. The attitudes must be positive and supportive and there must be a willingness to reward achievement. Structures must not be bureaucratic and should allow delegation of authority at the appropriate level, the ability to respond quickly without loss of accountability.
2. United Kingdom companies are quite good at seeking out external technology in Europe and at adapting it. United Kingdom are less good at transferring technology from the United States and even worse from Japan.
3. The definition is too narrow. Innovation is a *total* company activity involving all functions.
4. Government departments are ill-suited in their present forms and ill at ease in promoting and supporting innovation. They lack the light touch. Curiously the SERC has enjoyed more success in a supporting role.
5. Good analysts give well organised efforts at innovation a good press. The attitude of the City usually is to judge in retrospect. Thus effect during the emergence of an innovation is not great.
6. There are no major impediments or incentives in the legislative or regulatory framework. There is a fear that Biotechnology may suffer from uninformed regulatory action, especially within the EEC.
7. This is conditioned primarily by the industrial will and company attitudes. Things can always be improved in HEIs, Research Councils etc. but that is not the prime factor now.
8. The United Kingdom has a position no worse than any other EC country. Those companies who are active and take initiatives have more benefits than those who do not. However, there is a stronger national ground swell in Germany and France to do better which needs a response from the United Kingdom companies.
9. The relationships between suppliers and companies are increasingly more important. It does not happen of its own accord, companies must work at it.
10. An appropriate infrastructure in terms of skills available, financial incentive will encourage investment in innovation in the United Kingdom of Japanese companies.
11. No, it barely exists and is a source of great weakness to the United Kingdom economy.

I shall be pleased to amplify any of these points.

*Geoffrey Allen*  
20 March 1990

**Examination of Witness**

SIR GEOFFREY ALLEN FRS, called in and examined.

*Chairman*

1710. Sir Geoffrey, we are very grateful to you for coming to help us today. Thank you for your note, which has been extremely helpful. I think you know the background to what the Sub-Committee is trying to achieve, so let us not spend time on that. Is there anything you would like to say by way of introduction or addition?

A. No; I think I would much rather respond to questions.

1711. I think it goes without saying that in the case of a chemical pharmaceutical company like yours innovation with the research and development that accompanies it is a very important part of its whole activities. We regard innovation as going somewhat wider than R&D. Would you like to say

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[Continued

[Chairman Contd]

a few words on how you see R&D fitting into the whole subject of innovation with the objective of making yourself more competitive?

A. If I may qualify your comments, first of all, I have now retired from Unilever, and I work for Kobe Steel, a Japanese company. It is very interesting to see that there is a very similar attitude in both companies towards the need for innovation. On the question of innovation, I have never regarded it as an R&D matter. In the late sixties and seventies I worked part-time for ICI and part-time as a university professor, and the thing I learned was that innovation had three parts. The first one was not R&D; it was identifying market opportunity or market need. The second part probably did involve R&D, certainly if a technical solution was needed to meet that opportunity. The third part—which many people forget about—is the question of having a business plan. If you identify the need and you have found or invented a product and the way of manufacturing it, they are only the first two steps. To make the innovation come true you need a business plan where, first, the product has to be made robust. People often forget that. That is the next development after R&D. Secondly, you have to have a cost-effective way of manufacturing it. You have to have a sales force and marketing effort, and then you have to make sure you can harvest the returns. The innovation is not secure until you have a financial return. I agree with you that it is very much broader than R&D, and it is a mistake we make too often in the United Kingdom.

1712. Where do you think the greatest mistake is made—on the marketing side?

A. I think in Britain the problem is in the business plan development. British scientists and technologists get very excited about inventing products, but not enough attention is paid to making that product robust and serviceable in the market place, and not enough attention is given to making that product an international rather than a national one. But the real problem is putting the business plan together. I notice that one of the people who has come here has commented on the poor management ability in British industry. I do not think it is necessarily poor. I think British industry is weak in some respects, and the weakness lies in the ability to put together a business plan with an innovative idea at its core. We do not have so many people with the energy, drive and vision to do it as appears to be the case in the States. We do not have the teamwork which the Germans or Japanese can bring to bear at that stage, and that is when all the functions have to come together. We do not have enough champions, because when you have a business plan somebody has to stand up and be counted and promote it. It is at that end of the innovation chain that we are weak, and it is not necessarily just management. We have a lot of very able managers, but what we have too few of are the people who can lead on the business of innovation.

1713. What you are talking about is one aspect of the business plan?

A. Yes, but it does not mean that British managers overall are weak.

*Lord Flowers*

1714. You rather personalised it in a way. You said you had to have somebody to push it and promote the innovation?

A. Yes.

Is that an essential element of the business plan?

A. Yes. It has to be either a man or perhaps, as in Germany or Japan, a team, but there must always be one man who is determined to see it through, whatever else happens. I have never seen one succeed without that element.

*Lord Kearton*

1716. A product champion?

A. Yes.

*Lord Whaddon*

1717. What are the main characteristics of such a person? Should he be a scientist, an economist, or should he simply be greedy for money?

A. The best champion is a man who can be absolutely single-minded when he has to be and still has the ability to pick up the warning signals and helpful contributions from others who are saying something slightly different from what he is thinking at the time.

1718. His background does not matter?

A. No; he could be a general.

*Lord Erroll of Hale*

1719. He must be dedicated?

A. Yes; he has got to live and sleep worrying about the problems.

1720. It is not a very happy quality of life, is it? Not everybody wants to be dedicated to that extent?

A. Anybody who is going to be a good innovator has to be dedicated, and most people who have achieved something have had a period like that in their lives.

*Lord Taylor of Gryfe*

1721. When you were with Unilever you were concerned with a wide range of products—not only consumer goods but agricultural goods. How did you identify the products which were worth R&D effort?

A. First of all, Unilever has a very broad science base, so things can pop up all over, and quite



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[Continued

[Lord Taylor of Gryfe *Contd*]

unexpectedly, so they are there to be harvested. I am not sure Unilever realise fully that they do have a remarkable business structure. First of all, the business is broken down into seven areas each run separately by a business director, but within each area there will be 30-50 small companies. In R&D, if you have a good idea, the first thing you have to do is decide which area you think should be explored. You do not then necessarily go to the head of the business; you may go to the company chairman whom you recognise as a man who is an innovator, or is in need of innovation, and you sell it to him. The marvellous thing about Unilever is its business matrix. The man who has an idea targets the business area, and within that area he has several people he can go to.

*Chairman*

1722. When you say "area", do you mean "geographical area" or "business area"?

A. One would pick a business area. When I was in Unilever it was concerned with soaps, toiletries, chemicals, frozen food, ambient temperature foods, oils and fats, and agribusiness. You would pick one of those. To give you an example of how it operates, we had a man working on vaccines for animal feeds. He worked on a vaccine called Intagen which controlled E-coli in the gut of pigs and had the result that fewer piglets died at birth. In developing the vaccine, that man met Caesar Milstein who was working on antibodies, and he immediately realised that the use of that lay not in therapy but diagnosis. He went away and developed a series of monoclonals to diagnose various infectious illnesses. We did not have a medical business at all but we did have a toiletries business concerned with over-the-counter items which were not just passive but active. We tried it on the toiletries people and they did not want to know. At that time they did not want to be concerned with diagnostic kits for diseases. In trying it out we gave it to Southampton University, and one of the doctors who tried it out said, "It is a good kit for diagnosticians, but do you know that one part of it—the rubella element—actually detects HCG hormones like nobody's business?" Of course, that is the hormone which is released during pregnancy. Immediately, everything on infectious diseases was stopped and we switched to a pregnancy kit. I remember I was first told about it in October 1982. In June 1985 we opened a factory to make pregnancy kits. We persuaded Unilever—I must say that having Ken Durham around was very important—that we could form a health care business, and that is where we are now. We have a company called Unipath which is now world leader in pregnancy testing, and it does not just sell in UK; it sells a range of household products. One of the biggest distributors in the States is distributing it. It has one-third of the world market for pregnancy testing.

1723. But that change of direction was decided upon centrally?

A. It was decided by three people. First of all, there was the scientist who got the signal from the medical people in Southampton. Secondly, there was one man who was at that time in charge of the chemical business. He was an entrepreneur, and we had already got him interested in biotechnology, because we wanted to switch from chemical sources to renewable sources in some of our areas, like flavours, gums and so on. We knew he would be the right man, and we deliberately sold it to him and we also persuaded Ken Durham; we made sure we pressured him. The entrepreneur was the man who made the innovation stick; he drew up the business plan.

1724. It required a receptive atmosphere at the top?

A. Yes, but hopefully we chose a receptive man. There is a big element of that in any big company. Any company needs a broad R&D base if it is to pick up these innovations coming from different directions, but the people in R&D really have to be a bit sensible about it and not bang their heads against a brick wall. It is no good going to somebody whose business is declining.

*Lord Erroll of Hale*

1725. What happened to the medic at Southampton? Did he disappear?

A. No; I think he stayed on as a consultant, and I think he was very happy to do so.

*Lord Gregson*

1726. The Japanese do it without an R&D phase, and they are extremely successful. Is this not an alternative?

A. Who are the companies who do that?

1727. All the large Japanese trading houses have enormous information and research on which they can draw, and they feed it into their D organisations, and that is totally in touch with the market?

A. I would not under-rate how much R is in such a D organisation.

1728. There is less R and a lot of D?

A. I know Mitsui very well, and they are very good at it. For instance, they took tissue culture work from the UK and the States. In Mitsui, biotechnology was run by a man called Nakata, you find they have a very good tissue culture research group which knows exactly where to send their people. But I agree with you that the number of people in development is higher than it would be in the US or UK.

1729. Did you not give the game away when you said they were really doing little tissue culture development work but they were doing a little bit of work in order to understand and collect research information?

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[Continued]

[Lord Gregson Contd]

A. They start the work before they start to collect.

1730. But it is a small operation?

A. Yes, but not as small as you imply.

*Chairman*

1731. Would you say they have enough research effort to be able to absorb information they obtain elsewhere, and is that very important?

A. Yes. Yesterday, I gave an interview to *Asahi*, the "Times of Japan", saying much the same thing that Lord Gregson has just said, but do not over-estimate it. What is happening in Japan now is that the number of people in research rather than D is increasing. The manufacturing capacity of Japan outstrips the ability of the R base of Japan to supply it, so they are going on with what they have done very well for years—milking the rest of the world—and they are very good at application. I agree with you, but I would not take your analysis too far.

*Lord Flowers*

1732. Sir Geoffrey said earlier in connection with a business plan that at an early stage one had to internationalise the product?

A. Yes.

1733. What is meant by that?

A. In the early stages of an innovation it is very easy to take your market inputs from a small company and you can then isolate the product; with food you can do it very easily. You can make a food product which just sells in the UK. The great thing in Unilever is that it was not a problem, because in a given area we could produce three or four people from across Europe, somebody from the States and somebody from Japan, and get a market profile. A weakness in the UK that is pointed out by your question is that we are not so good at doing international market surveys.

1734. But you were referring to the marketing of the product and its internationalisation, rather than R&D?

A. Yes. The product you make comes from a market specification in the end, and the Japanese excel at international market surveys.

1735. Does the manufacturing base have to be internationalised?

A. That depends. For example, Unilever's the world leader in pregnancy tests and we manufacture everything in the UK, but that cannot go on for long. We will have to internationalise it, just as you see the Japanese have been very successful and they have had to go outside Japan to manufacture.

*Lord Gregson*

1736. The Japanese have a worldwide information service for marketing. Have you ever looked at the structure of a Japanese embassy and seen by whom it is staffed? They have an incredible system for gathering scientific information which is far beyond anything we or the Americans do?

A. Yes.

1737. That is the basic information which is fed into Japanese industry?

A. But may I say that that is a narrow view of the problem. You need a receiver for the signals which are being generated, and this is where Japanese companies excel. They receive the signals and do something about it.

1738. But it exists and it works?

A. Yes.

1739. And they have been successful, have they not?

A. Yes, and they are successful not just because the embassies do it; they are successful because companies put many of the best people whilst they are still young round the world to take part in this information-gathering activity.

1740. Is that not the comment I have made?

A. You were referring to the embassies; I am referring to the role of the companies as well.

*Chairman*

1741. Would you think that if our embassies did something like the Japanese it would be helpful in terms of our innovative effort?

A. Only if the companies were prepared to respond. You have to have a receiver. It is one thing having a transmitter, but you must have a receiver. The Japanese since the war—and, I suspect, before the war, although I am too young to know—have been doing this very well, and they put a lot of money into it in the early days to get this information, even when they could not use it. I agree with Lord Gregson, but there are two ends to it; it is not just people outside in the world but people in Japan picking it up, and I am witnessing this first hand.

*Lord Gregson*

1742. Is it not a good alternative to doing the research yourself?

A. You do both; Unilever does both.

1743. But the Japanese do not do research?

A. Yes, they do, but not as much as we do.

1744. They have been extremely successful—more successful than we are?



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[Continued]

[Lord Gregson *Contd*]

A. In research?

1745. At penetrating world markets?

A. Yes, but that is to do with marketing as well as research. They have gained their markets in the last 20 years mainly by putting effort into understanding the market, having a good development area and a good application to meet those market specifications.

*Lord Kearton*

1746. They have studied very carefully what the customer needs; that is the area on which they have concentrated?

A. Yes. I sit on the NEDO Biotechnology Committee, and it is very interesting to listen to the pharmaceutical biotechnologists versus the people in food. The pharmaceutical people are sure they can tell their customers what they want. If you are in food you have to listen to your customers. The Japanese are very good at listening.

*Chairman*

1747. In your experience, would you say that almost all the Unilever products were market-led; in other words, it looked for a market, arrived at a specification and tried to meet it? Were any appreciable number technology-led?

A. I was making a general comment about innovation needing first a market survey to know where the opportunities are. Yes, Unilever is very much a market-led organisation. When I joined Unilever I did not know anything about its research; it was only when I got there I discovered how extensive it really was. But I did know they could read markets, like soap, food, ice cream and so on.

*Lord Kearton*

1748. What happened to the palm tree cloning work?

A. That was market-led. The man who suggested palm tree cloning was the man who was buying oil all round the world. He was not a technologist at all; he was actually in the equivalent of Mitsui. That was a company called United Africa Company International, which was our trading house. This man knew how difficult it was to buy the quality of palm oil that we wanted. At the time the vegetable oil suppliers were in disarray. He came forward and said, "Why are you trying to use tissue culture to get perfumes when all you need to do is make palm trees to give more palm oil?" That was how it all started. The process did not start as being science-led; the science came behind a market objective.

1749. Was it successful?

A. You know what happened. It was successful up to the point where we were producing about 10,000 trees a year. When the same entrepreneur who got hold of the pregnancy test decided he would put that

up by a factor of 50 in one year, we started producing palms which had mantled fruit but did not produce enough oil. Something went wrong with the scale-up. If we had taken it up by a factor of 5 I reckon we would have done it, but a factor of 50 caused problems. I think it was due to a hormone deficiency; there was something in the feeding of the line cells which gave us the wrong product. But there is no doubt that when you go back to the 10,000 a year you can select them for high yield or good disease resistance or for a particular formulation of oil.

1750. It seems to me that Unilever is as quick to spot troubles and difficulties and drop things as finding new things to do?

A. It does not feel like that inside! As with any organisation, you know the pressures and tugs of war which go on, but I think there is tremendous confidence in Unilever, and if you are to be innovative you have to be resilient about failure. You have to be able to accept failure, because you will fail quite often.

*Lord Whaddon*

1751. Quite a proportion of the enthusiastic ideas come to nothing?

A. Of course. The main job of senior management is to get people on their feet again and to have a go somewhere else.

*Chairman*

1752. You are now involved in a Japanese company. Can you say how you see the difference between Unilever and that Japanese company as far as innovation is concerned, and how we might learn from it?

A. I have been there for only six weeks, and three of those weeks have been spent travelling round the world doing other things. It is different from Unilever in that it is more centralised. The other difference is that they actually try to plan their research, whereas in Europe and the States we like to have a base bubbling away with ideas. They will try to plan it, and that is another reason why what appears to be a small research effort is not as small as you think. They tend to have the research in one or two areas, but when you get there you find it is much more extensive. Looking at the spread of research as we would judge a company, it is not so extensive.

1753. Is it not true to say that their research is more at the applied end of the spectrum?

A. It becomes applied, because each research group is focused on an objective, and they have a business planning group and research planning group which are interacting all the time. In the west, we tend not to do that. We have business planning groups, but usually the research is more *ad hoc* than trying to hit the targets that the business plan has set

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[Continued]

[Chairman *Contd*]

up. The second thing I have noticed is that they are very careful not to tackle too many targets at once. If there is a disease in Britain, it is trying to do everything at once.

*Lord Taylor of Gryfe*

1754. Every year Unilever spend about £390m—a colossal figure—on R&D. How much of that is in-house and how much is done in the universities, and could you comment on the relationship between Unilever and the universities?

A. Of the £390m, 60% is spent outside the UK in our operating companies, and it is in D. The one thing we have learned from the Japanese is to put more money into D. Therefore, perhaps slightly more than £200m of the £390m is in development in local companies, tailoring the products to local needs, which is the international dimension. Of the £150m, we try to put up to about 6-8% into the universities. That 8% covers an enormously broad spectrum, because when you are funding research internally or externally and it is not focused, the research is relatively cheap. With a small amount of money you can cover a lot of things. We would then take another 10% or 12% of the money to take those ideas inhouse and turn them into feasible products. But the bulk—80%—would be spent on targeting the feasibility and turning it into a development project and feeding it to one of the companies.

*Lord Kearton*

1755. Would you like to comment on the quality of the university research?

A. It is as good here as anywhere else in the world. There is a great loss of morale in the UK. This has happened in other parts of Europe; for example, it has happened in Holland. Somehow they are getting their act together and getting over the problems.

*Lord Flowers*

1756. The 6-8% is 6-8% of your R&D budget?

A. Yes.

1757. It is a very high percentage for the UK, is it not?

A. It depends how you do the sums.

*Lord Gregson*

1758. The percentage of turnover spent on R&D is quite small by world standards?

A. That depends on the business areas. In food, the average spend round the world is about 0.8%; we spend 1.5%.

1759. But if you look at Germany and Japan—our real competitors in world markets—it is much less?

A. No. If you look at food companies in Germany, Japan, France and Switzerland, Unilever

is amongst the top spenders; there is no question about that. What you put in in a given area does depend on what you are making. In food, you spend a lot of money on support in the market place on things like hygiene, which is not research.

*Lord Kearton*

1760. If you take some of your food products, like ice-cream, a lot would be spent on the hygiene side?

A. Exactly.

1761. You had a major expansion in the fragrance business. Did the research side come into it?

A. In the fragrance business Unilever began the process of switching from chemical routes to fragrances and flavours to biotechnology routes. Every one of those has come through either the research department or by buying-in selected small companies with the route, and again the R&D side has played a role in identifying which are the key companies to buy to augment one's own skills.

*Lord Gregson*

1762. If you take the total company of Unilever and compare it with the Japanese and with some of the larger conglomerates Unilever's R&D spending is much less than their R&D spending, as a percentage of turnover?

A. If you choose chemical companies, that is true; if you choose food companies in Germany it is not true.

1763. Taking the overall activities of Unilever, not just food, comparing them with a large Japanese trading house having a similar range of activities, your R&D spending is much less?

A. No, I do not think it is; you must compare like with like. If you take the Japanese equivalents of Unilever—for example, Kao—the R&D spends are not so different. We monitor it every year. For example, as regards Nestlé, I suspect we might have 0.1% extra in our R&D spend. Procter & Gamble outspend us a little in soaps and detergents.

*Lord Kearton*

1764. How do you maintain the internal culture year after year? You have to keep people trained in the culture to identify these products? It must be one of the main functions of the top brass?

A. That is about people working together, and playing together; it is all about career development and giving people their head when they are young and letting them have some experience. If they get through, fine let them go on; but if the good man fails you pick him up and give him a chance.

1765. This is done in-house? Do you send people off to business school?



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[Continued]

[Lord Kearton *Contd*]

A. Yes. The last thing I did in Unilever was send my no.2 to Harvard for three months. We always send the very best; they have to earn the right to go.

*Chairman*

1766. Do you find that you have a product champion in Japanese companies?

A. That is very interesting. Unilever's Japanese company has had a chequered history. The best product champion we have had has turned out to be a young man from Liverpool who was sent over there as marketing director. He is now running the detergent business, not just the marketing side. That is the sort of transition you get. One of the marvellous things about sending a chap abroad is that the perception you have of him in the UK begins to change, because very often he is having to play on a wider front.

1767. They have not done it naturally; they are picking up ideas from us?

A. Yes.

1768. Is there a problem with product champions in this country in terms of giving them enough authority? They may be R&D champions, but from your experience do they have enough financial authority?

A. It depends on the company structure, but it does depend on the individual. There are individuals in any company who can give the chap the authority he needs. What he has to be given is accountability as well. It is putting the two things together that is the key.

1769. Was that how things were done in Unilever?

A. Yes. I have to say we do not always do it as well as we should, and there are black spots and bright spots.

1770. But you regard it as important to do that?

A. It is essential. In an innovation, you cannot have a team coming in to interview a chap and saying, "We will make this change and allow three months or six months"; you have to trust him.

1771. To return to your comment about business schools, do you think business schools might do more to educate potential, future managers about what you have been talking about—about the importance of a business plan for innovation, product development and so on? At the moment, they seem to do what I might call strategic planning, not down-to-earth planning?

A. Yes. Very often, innovation is not about strategy.

1772. Could they do more to help solve the problem?

A. I am not sure about this. I think one of the great benefits of business schools is that they can take a man who has some achievements behind him and they expose him to a wider set of things, and suddenly there are new ideas growing in the man.

*Lord Kearton*

1773. At what sort of age?

A. I think he should go to a business school between 30 and 35; 28 would be the earliest. You really must have your feet wet before you go.

1774. A fortnight ago we had Professor Bhattacharyya before us. He said a lot of people were setting up outfits similar to his; it was being copied. Are you happy about the way it has developed?

A. Yes, I am in one sense; Professor Bhattacharyya has now had 350 people in engineering through his school.

1775. He said the figure was 400.

A. That is Bhattacharyya! The other 50 are still on the way. He really made an impact when that area of engineering was a no-go for most people. He has now brought it to the fore. I backed Bhattacharyya for two reasons. One was that he believed in what he was doing; the other was that, if the truth be known, he was a bit of a naughty boy. He was prepared to go round obstacles or cut corners, which you have to watch.

*Lord Taylor of Gryfe*

1776. Watch or encourage?

A. You have to do both. You give them a chance and also accountability. What we did do was get him into a university where the vice-chancellor was able to watch him and was prepared to let him get on with it. I think it is just as important in developing a university department or research group to have both the ability to do what you want to do and the accountability which goes with it.

*Chairman*

1777. Can we turn to what government can do to help the whole innovation scene in UK industry?

A. I did say in my letter that government departments are ill-at-ease in trying to support innovation, and I think there are two reasons for that. First of all, it is in the very nature of government departments that they are highly structured and bureaucratic, and given the previous discussion we have had it is difficult to fit innovation into a bureaucratic system. That is the first problem facing government departments. The other problem concerns the nature of the particular government. If the Government says it is not its job to get involved in market forces, then a government department is hesitant in a situation where it already finds itself in a difficult area, and the two things together lead to

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[Continued]

[Chairman *Contd*]

dreadful uncertainties, as we have seen in the DTI, to be fair. I am not very critical of it, but what I think they should do—and I believe my experience supports it—is give the task of supporting innovation to people once removed from the department but who are still accountable to the department. In SERC we had a marvellous activity which Robin Nicholson chaired. We set up a thing called Collaborative Schemes with Industry, and in four months a university group and industrial group applying to us would know whether or not they would get a grant. We did not go round chipping the last penny off the grant; we said, “By and large, we think that is right; go off and do it.” Very often, the problem with the DTI, if I can be forgiven for saying so, is that they cannot operate like that; they have to have much more rigid terms. During my time in Unilever, we rejected every DTI grant we tried to negotiate because we just could not wait. It was not always the fault of the DTI officer; he had to refer it to the Treasury. The whole process was too cumbersome. The great thing about research councils is that they are lighter on their feet. Of course, the ABRC will take money back if you have not spent it wisely.

*Lord Flowers*

1778. The DTI did try to set up an arrangement with the research requirements boards. Why did it not work more satisfactorily?

A. The great thing about the collaborative schemes we had was that we were not trying to plan an area of technology or science; we would respond to individual needs and rely on industry to know what their business was and where they had to make the innovations.

*Chairman*

1779. What was the case that industry put to you for financial support—that it was too risky for them to take on by themselves?

A. No. The case was very simple: they saw a need, and they needed *this* R or D to do it; they did not have the in-house capability, but *this* university group did.

1780. Why did they not place a contract directly with the university?

A. If we go back to the late seventies, there was very little feeling in industry that they could do it, and we wanted to work with industry. The Engineering Board set itself up to capitalise on research in industry and encourage it, and we used it and acted as a catalyst and profited from it.

*Lord Gregson*

1781. To go back to Lord Flowers' point, the Requirements Board in dealing with the product and process development scheme under the Industry Act reacted to industry; they were not schemes advanced by the DTI. As Chairman of the Requirements

Board, I was entirely dependent on industry coming along and saying, “We want to do this and that”, and surely the amount of money spent on product and process development by the DTI considerably exceeded what SERC was spending?

A. Yes.

1782. It was entirely reactive to industry?

A. Indeed, but it was spent at a different point in the chain of innovation.

1783. It was spent on D?

A. Yes, exactly.

1784. You said that was what SERC was spending its money on—on the Engineering Board?

A. Nevertheless, SERC spent it mainly on R, and only when there was a big hole or when there was an appropriate university group to do it would they go into D. The DTI's role was very much more to build into the company that extra D.

*Chairman*

1785. Are you saying you think the Government's main task is to act as a catalyst and encourager rather than fill a gap because the work is too risky?

A. Yes.

1786. To encourage management who are not sufficiently receptive to the importance of innovation?

A. Yes, or to persuade the company to hire another man who is. Lord Gregson's point is very important. The best collaboration between SERC and DTI is where we have got the two end-on; SERC is at the nucleating end and DTI pick it up and feed it through. We have had some marvellous examples of that.

*Lord Gregson*

1787. I chaired the first joint committee between SERC and DTI, and the whole thing was much more dependent on DTI funding than SERC funding.

A. I accept that but, with due humility, I did start one through SERC, and it happened that I had a good friend in DTI who took it on.

*Lord Taylor of Gryfe*

1788. You have talked of government involvement and direct grants from the DTI. Have you looked at the question of fiscal incentives to encourage research and development as another form of government intervention?

A. Yes. I am not very keen on fiscal incentives; I really believe it has to be in the guts of the company. The company has to have the enthusiasm and will to see it through. I think fiscal encouragement to do it



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[Continued]

[Lord Taylor of Gryfe *Contd*]

leads to more disaster. That is certainly true inside Unilever, and I have seen it in this Japanese company already.

*Chairman*

1789. Given the present state of British manufacturing industry, do you believe that some more activity by government of the kind you have described would be beneficial?

A. If you are prepared to back winners and proven people it will be beneficial; throwing support at everyone at large will not be helpful.

*Lord Gregson*

1790. That is moving to near-market?

A. Yes.

*Lord Taylor of Gryfe*

1791. How do you identify the winners?

A. This is where skill of selecting little working groups or individual people comes in. I am not too keen on having committees. In my time in SERC, we moved towards having a few directors who had limited powers to spend but could spend before going to the committee. They came back to the committee to justify what they had done in the last three months. That was much more effective when it came to working with industry in a fast-moving situation.

*Chairman*

1792. Let us move to the City's attitude to innovation and the question of "short-termism". I do not suppose that a great company like Unilever is much bothered by City attitudes?

A. On the contrary, we expect to get good marks for being good at research. We never talk to analysts without saying, "Look, this is what we are putting into research and why, and this is what we expect." We have never been written down for that. I am a non-executive director of Courtaulds and I can see the same forces at work there in the new chemicals side. We are picking up very good comments from the City because of our R&D.

1793. You believe the answer to the criticism that the City has a short-term outlook is for companies to explain what their R&D programmes are for and gain the City's confidence?

A. Yes. I think it is difficult for small companies to find the time to do it, and in that case perhaps the City is a bit intolerant, but it certainly works in the City. If you go to Wall Street you will find it very hard to get them to listen to R&D; it is much more fierce than in the City. But for small companies in the States there is still a bit of the old entrepreneurial spirit left and people will have a go, but not so much in the City at the moment. That is a very rough judgment.

*Lord Taylor of Gryfe*

1794. You are referring to the venture capital market?

A. Yes; I think it has gone a bit flat.

*Lord Kearton*

1795. How do you think we compare internationally? You have had experience of a large international company, and you are now involved in a large Japanese company. In your original letter of 20 March you refer to "a stronger national ground swell in Germany and France to do better which needs a response from the UK companies". Can you enlarge on that?

A. I think one has to say that at the moment in the chemical sector and in the non-durable consumables, to take Unilever, we match fairly well with the rest of the world. I think that chemicals in particular are an amazing part of British industry. But there is a feeling in other parts—again, I would have to exempt Rolls-Royce from this after all I have seen in the last few months—that this is all tied up with our destiny and so on, whereas, for example, the French are out fighting. Thomson are not doing all that well in information technology; they have taken quite a beating.

1796. They are taking enormous risks?

A. Indeed, but they believe they have to do it.

*Lord Gregson*

1797. With government money?

A. In part, yes.

1798. The company is government-owned.

A. Yes.

1799. It must be government money.

A. I am not sure about that. Certainly, government money is very much involved in France, but they generate sales and it is difficult for us to know where it starts and where it stops.

1800. In Thomson it is perfectly clear; it is government-owned.

A. You know that better than I. Certainly, there is a feeling in all the factories that they are part of a national organisation. In Germany, it comes from a different source. In my view, in Germany the skills at all levels in manufacturing industry are incomparably better than ours, and that breeds an interest in what they are doing and a confidence in what they are doing. I see it now in Unilever's factories in Germany in a way I do not see elsewhere in Europe, and it is on that that I base my comment.

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[Continued]

*Lord Flowers*

1801. Is that due to the nature of their education system?

A. It is not so much the beginning of the education system, because there are parts of Germany where it is just as desolate as our system, but I wish we had the skill technical training they have for the 16-20 age group; I am envious of that.

*Chairman*

1802. Training for professional chemists, scientists, engineers and so on?

A. No. They excel in the provision of skilled technicians.

*Lord Gregson*

1803. Their training of engineers is far better than ours.

A. Yes.

1804. It is a five-year course.

A. I have just been part of a European study which said that, and I actually put it in.

1805. It is a very, very successful training scheme for professional engineers.

A. Yes. It is a very costly scheme, but it works jolly well.

*Lord Kearton*

1806. How do you think we will fare in the 1990s? What should we do that we are not doing now?

A. We have to do two things. First of all, we have to repair the skill base in the UK, whatever else we do.

1807. That will take several years.

A. It might take more than a decade, but what we have to do immediately is some very good marketing analysis on the continent to decide what we can sustain on a European basis.

*Chairman*

1808. Insofar as funds are limited, would you say we need more effort at the technician end or the professional scientist engineer end?

A. I have to say I think there is still an adequate supply of good scientists and engineers coming out at graduate level at the age of 21. The weakness is going to be at the super-technician level, because if you look at the demographic trends we are going to have a big decline in the numbers. The number of people in universities will not decline by anything like that amount, so all the cuts will come in that stratum of society that provides the skilled technicians. If I have one fear, it is that we will have an insufficient number of trained personnel.

1809. You do not think we are doing nearly enough in that field of skill training?

A. No. We are leaving to market forces things which we have to have before we know what the market forces are. It is a bit like having a science base that is broad; you have to have a broad skills base.

*Lord Flowers*

1810. It is often said that we do not need more scientists; we need to find more skilled applications.

A. Yes. I think we ought to be developing our application skills to match the science base rather than chopping that down; anything else is unsustainable.

*Lord Gregson*

1811. You can do only one.

A. I certainly would not cut out the science base.

1812. In effect, you are saying that the science base is more important than application?

A. No; I think it is essential; it is an essential prerequisite to application. I am not going to say which is more important, but you cannot have one without the other.

1813. You can buy science in.

A. If you wish to be market leader you do not buy science in.

*Lord Kearton*

1814. If you look at the training schemes for technicians and others in this country, the drop-out rate is very high and the quality of courses does not remotely compare with that on offer in Germany. From what you say, we should still put more emphasis on doing something because of demographic considerations and step-up vocational training for 16-20-year-olds?

A. As regards certain features of what we are doing now, the dedication of people involved in training schemes is very high, but the system is set up in a way that fragments the training, which is a problem. You have to have continuity across the board in training, not here and there and responding to what is going on today, because it will be too late by the time you get to tomorrow; you will find you have got the wrong people there.

*Chairman*

1815. What is your experience of collaborative development ventures?

A. I have a very simple view on that. Where the collaboration is end on it works very well, that is to say, if you have two or three collaborators, each knowing it is his decision and responsibility, and he hands it on to x and then x to y.

1816. In different companies?



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SIR GEOFFREY ALLEN

[Continued]

[Chairman *Contd*]

A. Yes, or in the same company; it works very well. Where two groups go together and want to fish in the same pond it is a disaster.

*Lord Gregson*

1817. What about pre-competitive research? Is it real?

A. I do not understand what it is, quite frankly. What is real is that there is some fundamental, basic research out of which something pops up, and the man who picks up what pops out has to have a reason for it—because he wants to get on in academia, or because he wants to get on in industry, and sometimes he wants to get on in government. In Unilever I never had anything I looked upon as pre-competitive.

1818. Would you stop funding pre-competitive research?

A. I would just stop talking about what is pre-competitive and what is strategic research.

1819. But pre-competitive research is very carefully controlled; everybody has the same interest in the intellectual property.

A. I sit on committees in Brussels, and I just do not understand it, but I do know a good research project when I see it.

1820. Would you stop funding it?

A. I would stop talking about it and get on with funding the best research projects.

1821. Would you divert funds to other more important ways of doing it?

A. It is still research; we are talking about how you select the research projects, not diverting research money.

*Chairman*

1822. As I understand it, the term “pre-competitive research” means research in which different companies can collaborate without getting in the way of each other in a competitive way?

A. But that is just background research.

1823. It is university-type research?

A. Yes, and that is what I would fund; that is the science base.

*Lord Gregson*

1824. I would de-fund it.

A. You can waste endless hours talking about what is pre-competitive and what is strategic research; it is nonsense.

*Chairman*

1825. You said earlier you thought the Japanese put more of a spotlight on near-market research. You are saying we ought to go further in that direction?

A. I thought EUREKA was going to do that; and I am just about to join the EUREKA Evaluation Panel to find out.

*Lord Gregson*

1826. EUREKA is not funded?

A. That is a different question, and it is a difficult one. To me, EUREKA does not look very healthy, but I will find out, because we will be starting in September to look at it.

*Lord Kearton*

1827. What do you think of the Alvey programme?

A. I think it was worth doing, because it gave one sector of applied research an existence and a feeling that it was a community.

*Lord Flowers*

1828. Why did it stop?

A. I did not stop it.

1829. I was not blaming you.

A. I do not know why it was stopped. All I know is that there was a Minister involved who wanted it to go on and was very disappointed when it did not.

1830. It was a triangular arrangement, and I think it was a tragedy that it was stopped.

A. Yes. I am emotional about this because one-third of that triangle came out of SERC. Brian Oakley ran ALVEY; he started with me in SERC and developed the sector.

*Lord Kearton*

1831. He is about to publish a book.

A. Yes, and I am waiting for him to give me a copy!

*Chairman*

1832. You do not think much of collaborative R&D in the sense that two or three companies getting together to develop something on a collaborative basis may spend more than the value to be got out of it?

A. One of the problems about collaboration is: who will get the profit? That often gets in the way of it, not the actual doing of the R&D. In research, the thing which gets in the way is when each group has not got a clearly defined role.

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[Continued]

*Lord Gregson*

1833. Is that point not demonstrated by the fact that so much money and time is spent on trying to sort out the intellectual property rights of the R&D, and nobody has yet succeeded in solving that problem?

A. You and I agree on more things than we admit to.

*Chairman*

1834. Would you like to say anything about intellectual property rights? Do you think we should make any changes to copyright legislation?

A. I think that in terms of innovation, if people say that intellectual property rights get in the way they are making excuses. The choice is very simple: either you have to do something fast and you do not have time to take out patents and set your sails accordingly or if you have the time and you want to operate worldwide and prevent other people coming in you patent, but even then you make sure your patent is disclosed at the time it suits you, not at the time it suits the competition.

1835. You do not feel there is any change in law which would help innovation?

A. No. There is one area where I have seen patents working to the detriment of the transfer of technology, and that is in the Third World. I think Third World countries are just waking up to the fact that patents are a barrier to moving technology. Again, I think there are ways around it by deliberate means and not accidental. In innovation, I do not think this is a major issue, just as I do not think that legislation or regulation is an important factor.

#### Memorandum by Sir Geoffrey Allen

In addition to my evidence on 18 July I would like to append the following comments on the R&D scene in Japan. Most of the comments made by the Committee regarding R&D in Japan were a very accurate portrayal of the situation some eight years ago. It would be wrong to assume that the same situation obtains today. There has been considerable investment in research in the civil sector in Japan over the past decade and this is now bearing fruit. Witness for example the quality of research in high temperature superconductors and aspects of biotechnology and microchip technology.

It is true that because of history, the Japanese R&D effort is more skewed towards D. than is the case in many western companies. But there is no doubt that the balance is gradually changing and many companies are now investing heavily in research. The one I have joined in a case in point. They have made sizeable commitment to research in Japan in the 1980s and also they have set up laboratories in the United States and in the United Kingdom. Each of these laboratories is devoted to medium to long term research and the linkage with the Research Centre in Kobe is very carefully planned and orchestrated. For example the laboratories in the United States and in the United Kingdom are visited regularly by the cream of their research scientists. They have a linkman scheme which is appreciated by their non Japanese colleagues.

It was said that the trading houses such as Mitsui did no research and focused on buying research in the West to transfer to Japan. Certainly the latter was their role in the 1960s and 1970s and at the beginning of the 1980s. In the mid 1980s the trading houses were forced to reassess their position because by then Japanese manufacturing industry was becoming so proficient that there were fewer projects that they wished to transfer back to Japan. My reading of the situation is that the trading houses are more likely now to indulge in a two way exchange of technology.

*Lord Kearton*

1836. Touching on Sir Geoffrey's experience, we retire people rather early. Sir Geoffrey retired from Unilever when still a young man. In the case of several Japanese companies, some of the people with considerable industrial force and drive are 15-20 years older; they manage to maintain their commercial drive?

A. With respect, they start talking about retirement at 55, unless they are the people doing the talking. It is a very select number who stay on to 70-75. The same situation applies in the universities; it is 60 or 65, depending on the state university. I think there is merit in this. The one thing I tried to introduce in my SERC days was a geriatric scheme under which you had to leave your administrative post at 60. You could go on to take money to do research—SERC money—but you would leave the running of the department to a younger man. The Japanese are very good at that.

*Lord Gregson*

1837. Is it not true that in Japan the restatement of career takes place at 40-45; the company stands back and reassesses your future?

A. In Kao, for example, the age is 35 if you are a technologist; they decide whether or not you will go into marketing etc. A very conscious analysis is carried out; I agree with you.

*Chairman*

1838. Sir Geoffrey, thank you very much for the time you have given us. What you have said is very helpful.

A. If it is permissible to say so, I have enjoyed it tremendously.



*18 July 1990]**[Continued*

The comment was made that many able people were allowed to remain until 70-75 years old in Japanese companies. I made the observation that that was the exception rather than the rule and true only of a small number of very senior people, especially company Presidents. I have checked this observation with my colleagues and certainly on the whole, retirement ages from industry in Japan tend to be around 60 years old for senior management and middle management, sometimes lower. This is true of some of the State Universities. In Tokyo University which is generally accepted to be number one, all my contemporaries have retired at the age of 60 and moved on to other posts outside the University to begin a short second career.

In my written evidence about Europe I commented that there was a ground swell in manufacturing industry in Germany and in France that did not have an equivalent force in the UK. This was challenged and it was stated correctly that of course in France the Government was very much involved with manufacturing industry. This is certainly true in cases of large companies such as Thompson. I would refer you to an article in the Sunday Times of July 29 in the Business Section which gives a very similar view of the French scene to mine. My point was not that Government money may or may not be involved but rather that the optimistic ground swell was there to be seen.

I stand by my comment with regard to Germany where there is a similar confidence and optimism based there on technological proficiency and good training. West Germany is not daunted by the prospect of taking on the weaker manufacturing industry of East Germany because it has the confidence that it has the strength to put things right probably within a decade.

Whatever the cause for optimism and confidence in Germany and France would that it were present in the UK in all sectors of manufacturing industry.

*Sir Geoffrey Allen*  
*1 August 1990*

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Mr F D ROSENKRANZ  
and Mr N DENNIS

[Continued

**Examination of Witnesses**

Mr F D ROSENKRANZ, Chief Executive, BOC Vacuum Technology & Distribution Services, and Managing Director, Edwards High Vacuum International, and Mr N DENNIS, Technical Director, Edwards High Vacuum, called in and examined.

*Chairman*

1839. Thank you for coming to help us. You know broadly the object of our investigations; we are looking at the innovation activities of British industry with a view to seeing how they can be improved. I think you represent one of the group companies of BOC. Is that right?

(*Mr Rosenkranz*) Currently, I look after BOC's non-health care and non-gas businesses. That amounts to four businesses, of which two apply to this discussion. One is Edwards High Vacuum, and the other one is an American company in the technological field on the west coast, again associated with vacuum.

1840. They are both in the sort of field with which Edwards High Vacuum are concerned?

(*Mr Rosenkranz*) The sort of field, yes.

1841. Mr Dennis?

(*Mr Dennis*) I am Technical Director of Edwards High Vacuum.

1842. What importance do you attach to innovation, and how would you describe innovation? How important is it to the competitiveness of your company?

(*Mr Rosenkranz*) It is quite important. We are in a lot of areas which I suppose could be described as "high-tech". If you produce something which is different and good you have a plus. You can survive in a lot of areas producing the same thing. A good example of that is that a good deal of our market lies in the micro-electronics industry. For example, we produce an innovative and quite different pump, for which we won a Queen's Award for Technology. Frankly, it has helped us a lot to get into a market situation, and it is important to us, because about 85% of our business is outside the UK, namely, Japan and the US.

1843. You developed that pump in response to market need which you perceived through market research?

(*Mr Dennis*) Yes. In the late seventies and early eighties we developed a new range of mechanical pumps which suited the market quite well but had certain limitations, and in the eighties we produced them in very big numbers. Having seen their limitations, we designed a different type of pump to overcome those limitations; we eliminated the oils in the pump. That innovative design got us a large share of the market in the semi-conductor industry. I think one company in the States said whereas they had been spending \$100,000 a year keeping one pump in operation, this new pump lasted a year without service.

1844. But that change was made in response to market need which you perceived?

(*Mr Dennis*) Very much so, yes.

1845. Is that broadly true of all your products, that you do research and development work in order to meet market need, or do you develop something and then try to create a need because you think it is a good product?

(*Mr Rosenkranz*) Frankly, we are very pragmatic. I think we do very little where we do not think there is a market need. I would say that 95% of what we do is what we think will either improve our products against market application or where we think there is a need.

1846. You agree a specification against which the technical work is done?

(*Mr Rosenkranz*) In a way, yes.

*Lord Gregson*

1847. Would you like to describe the difference between being an independent company and a subsidiary of a larger company? Edwards was an independent company, and now it is a subsidiary of BOC?

(*Mr Rosenkranz*) It has been a subsidiary of BOC since 1968, so it is really part of the BOC Group. I think it depends on the parent company philosophy more than the subsidiary. The BOC philosophy on companies like Edwards and the companies I look after—the non-gas businesses—is such that you stand or fall on your own. They allow you to manage the business, having agreed a plan or direction, and you pay your way.

1848. What about product development?

(*Mr Rosenkranz*) Personally, I think they have taken the correct approach. Clearly, you have to have credibility and produce the sort of results and growth they feel is comparable with elsewhere and to have a portfolio they feel comfortable with, and you manage it.

*Chairman*

1849. If you identify a need for a new product and therefore expenditure on R&D and innovation generally and marketing would cost, say, £1m, would you have to submit a proper business plan for that product to headquarters in BOC, or could you just get on with it?

(*Mr Rosenkranz*) It is down to us, but you have to be able to afford it. For example, Edwards' turnover is up to about £130m or £140m a year. If it is to do something costing £10m, clearly it has to ask the Corporation, because it could affect its results for a few years. If it is something within normal parameters, the answer is that you get on and do it.



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Mr F D ROZENKRANZ  
and Mr N DENNIS

[Continued

*Lord Gregson*

1850. Every year you submit your budget to the parent company?

(*Mr Rosenkranz*) Yes.

1851. They know exactly what you are doing?

(*Mr Rosenkranz*) "Exactly" is a bit strong.

1852. They know within £200 or £300 anyway?

(*Mr Rosenkranz*) On development?

*Chairman*

1853. Let us stick to product development

(*Mr Rosenkranz*) Taking your question, the budget is based on sales, what profit you are likely to make, roughly what capital you will need and so on. They have a general framework. They will also ask about the future company direction, but I would not say it goes deeper than that; the whole process takes about three hours.

*Lord Gregson*

1854. But under the new accounting rules they are going to have to account for your R&D under SSAP13, so presumably you report what you are doing?

(*Mr Rosenkranz*) We report, but at the budget meeting we do not necessarily ask: Can we do this?

1855. Going back to my original question, they know exactly what you are doing from your report?

(*Mr Rosenkranz*) I personally do not think so.

*Lord Erroll of Hale*

1856. They know what you have done; you report after the event?

(*Mr Rosenkranz*) How much they can learn in three hours I do not know.

1857. Did you look at the article in the *Financial Times* by Simon Holberton explaining the rejuvenation of Edwards High Vacuum? I found that a very informative and fascinating article. Does it make you blush, or do you think it is a fairly reasonable assessment of what you are doing?

(*Mr Rosenkranz*) It is difficult to answer truthfully. He did do a fairly thorough investigation; it was not like another illustrious paper, which shall remain nameless, which tried to do one on us over the telephone, and, rightly or wrongly, I discouraged them because I thought their theme was wrong. He spent a full day with us and also interviewed John Stopford of the London Business School who had done a project for the Business School on Edwards. Does it flatter? Yes, it does flatter a bit; no company is quite like that, but directionally it is correct. To be fair, it did not pick up enough warts.

*Lord Kearton*

1858. Success in innovation does not mean simply good management; it also means having a superb product, or something which is radically new.

(*Mr Dennis*) It was new to us. The design was developed originally in the 1930s as an internal combustion engine, and it was then worked up into a compressor, and it was sold for many years as a compressor. I believe trains depended on it for a long time for brake operation. We picked up the design and thought it suitable for our applications, and the design went through a number of stages. In fact, we worked with the people who made the original pump in the late seventies. We constructed some system to pump some nasty gases, and it was then that we saw the advantages of the pump. When the semi-conductor industry took off in about 1980 we saw this as a potential way of making a pump which had no sealing fluid in its mechanism, and we worked on it from there. We had the pump running in three years, and we organised the testing by outside organisation like Philips.

1859. You manufactured it in-house?

(*Mr Dennis*) No; we could not really run it under the required conditions, because the conditions were such that toxic and highly reactive gases were being pumped. I am sorry I thought you said test; yes, we did manufacture it.

(*Mr Rosenkranz*) That is another skill, of course, and it ties in with innovation as such. We have gone in for quite sophisticated manufacturing techniques on precision engineering, which has allowed us to make a product like this. Frankly, one of the biggest tricks is how to make the thing.

*Chairman*

1860. You regard the close connection between innovation and subsequent engineering of the product as important?

(*Mr Rosenkranz*) Yes, the absolute key.

(*Mr Dennis*) The two must work together very closely in our type of industry.

1861. As a subsidiary of a big group, do you believe that that has advantages, or relative disadvantages, compared with being an independent company as far as being able to take risks on innovation and development?

(*Mr Rosenkranz*) Obviously, I can speak only for us rather than generally. I think it has been a help to Edwards. If you look at the history of Edwards, it was a very successful company until approximately 1960 when it ran into a lot of difficulties until 1968. Frankly, it then got very near to being insolvent. It had some difficult years matching up with BOC, given the history in previous years. It would have gone to the wall without a parent, and I was given the job as a last chance. We managed to change it round. The article does not say it, but the

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[Continued

[Chairman Contd]

Corporation funded it on the basis of a presentation. A lot of investment was put into it. From their point of view, I would not say it was a gamble; it was well thought through and discussed, but it was a lot of money for a business of the size of Edwards. There was a complete capital restructuring which not only doubled the capacity but totally changed our technology, and we sold it, not on the basis of the new dry pump, but the old pump. We had the micro-electronics industry coming up, and if one was going to go for it one should go for it and not mess about in the middle. To BOC's credit, they approved it.

Lord Kearton

1862. It sounds as if the product, the market and the man came together at the same time?

(Mr Rosenkranz) The dry pump came later. The original mechanical pump was the main reason I suggested to BOC we stay with the company because it was also an innovative product.

Chairman

1863. Was it at that time that you joined BOC?

(Mr Rosenkranz) I was part of BOC then. The main thing I identified with people like Nigel, who went through it for us, was that the particular product was innovative and was very, very good. The trick was how to sell more. We saw the micro-electronics industry on the way up, and it looked better than anything you could see around the world.

1864. Are you implying you probably could not have made that investment unless you had been part of a prosperous group?

(Mr Rosenkranz) The company had been losing money. The sales were then £22m. It was not making much money. You go to a bank with your hands out for £3m-£4m and say, "If you do not give the money quickly—within a month—so we can order the equipment, we will miss the wave". I do not know what sort of response the company would have got.

Lord Kearton

1865. You were a young man when you took it on?

(Mr Rosenkranz) Yes.

1866. What was your background?

(Mr Rosenkranz) I had been in BOC.

1867. What had been your original training—as an engineer?

(Mr Rosenkranz) Yes.

Lord Gregson

1868. Without detracting from the fact that you saw an opportunity and seized it, the basic position was that there was an original demand for vacuum pumps arising out of the nuclear programme. I must have ordered thousands of Edwards pumps in my time for various nuclear programmes, including Aldermaston. Those programmes finished in about 1960; a lot of the work tailed off. Then another opportunity arose, in that the micro-electronics industry built up. You were reacting to the effect of market demand which suddenly appeared, and you reacted very well. The growth of the micro-electronics industry in the early 1970s was meteoric, and you reacted to it, but it was market-led?

(Mr Rosenkranz) Totally. The only thing we ever do is development which we believe we can sell. As a policy, on everything we try to move with the market.

(Mr Dennis) In the mid-1970s we came to the conclusion that we should have a range of industrial mechanical pumps and we came out with a completely new range of designs. It was at about that time that the semi-conductor industry started to develop, and our pumps were found to be very good in that industry. We decided to go ahead; we saw vacuum pumps as becoming very important in dirty applications, so we decided to develop pumps which would stand up to those sorts of applications.

Chairman

1869. To go back to when you made the big investment, it was a fairly down-and-out company in grave difficulties. Do you think that being part of a big group enables you to do something with a very good product which it would not be possible to do on your own?

(Mr Rosenkranz) In my view, it would have been very hard to convince an independent person to give you the money within the time.

1870. You mean a bank?

(Mr Rosenkranz) Yes. I did not try it, so I cannot give you a definitive answer, but I think it would have been extremely difficult, because lots of things come into it when you are part of the company—personal credibility, has the guy produced before, does it sound about right?

1871. You had personal credibility because you were in BOC already?

(Mr Rosenkranz) They know you, and it helps.

1872. Would you subscribe to the view Sir Geoffrey Allen put to us in the last discussion that it is important when developing something new to have what he described as a product champion, that is, somebody fully in charge of the development, the business plan, the financing of it and so forth? Is that something in which you believe?



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[Continued

[Chairman Contd]

(Mr Rosenkranz) It is horses for courses. We have not been successful in some products because we did not have a champion; in others a champion was not necessary. I think there is no rule, but if you are trying to introduce something which is slightly off the main stream to be sold through an organisation which is dominated perhaps by some other products, at that point a product champion is a "must". That is a lesson we have learned with some products where I suggest we have not been successful. There was one which was technically quite innovative, but we never found the key of how to market it to move it from average to good. If in that area we had had a product champion and a little bit of organisation round him it would probably have resulted in a better decision. In respect of the new developments we are considering at the moment, in the last year and a half we have been trying that method, trying much more to lean towards a little group which supports something like this. The jury is out; let us see how we do.

Lord Kearton

1873. Do you find you have adequate manpower, in terms of tradesmen and graduates, for what you want to do?

(Mr Rosenkranz) It is difficult.

1874. Which is more difficult—tradesmen or graduates?

(Mr Rosenkranz) Probably graduates. We do an awful lot of training ourselves, which we have been doing since 1984. We have very strong training programmes and try to train people on courses right up to quite senior management levels. We have a graduate recruitment programme. I do not know how one measures the cash involved, but as a business I would say we spend something approaching £2m a year on training people and improving skills. We have a very high graduate population.

Chairman

1875. Do you see any problems at the next level—the incorporated engineer and highly skilled technician?

(Mr Rosenkranz) It is a British problem. We are in Crawley, and I think that causes us some difficulty. We are going to have to review our position. We have enormous difficulties recruiting production engineering skills, for example. I am not talking of a standard production engineer; I am talking of a guy with flare. We have great difficulty recruiting people like computer software people. We have been reasonably successful in recruiting development engineers, but that was after a lot of effort, advertising and cost. In addition, because other companies know we train well we are a bit of a honey pot. Fortunately, we keep people because the work is quite interesting. We are under some pressure in that respect.

Lord Kearton

1876. It appears to be an organisation in which everybody is made to feel responsible and, though part of a big industry, they are making a contribution which is appreciated?

(Mr Rosenkranz) We try to do that. I generally believe in this philosophy. When I was younger I was frustrated by this. You try to let everybody manage his own patch within reason; in other words, even if you are young you have your project for which you are accountable, and it is visible. It sounds more successful than we are, but we try to do that. We have very young people whom we have trained up, and we have run into the difficulty where we have very, very bright people, like the guy coming up from manufacturing with his PhD and a chap under Nigel with a PhD, and they get to a level where they do not communicate too well because of wider concerns. To overcome that, we have tried in the last year or 18 months to adopt a new method by which on all projects below director level the people leading it are people from marketing, manufacturing and technical areas. They do the plans. Clearly, we have agreed the plans and have had an input, but they lead it. We put it under the guise of "total quality", which I am not sure is the right expression, and they follow it. They do not have great financial plans, but it is their plan and that is what they are trying to do. That is the route we are following, and by that means we hope to retain people because they will feel involved all the way down. So far so good. We hope it will make projects much less up in the sky and less full of huge financial plans. It is difficult to get companies to write three pages on the financial aspects because life has made them do it that way. I think it is going well.

(Mr Dennis) The system seems to be working.

Chairman

1877. Do you think business schools could help by paying more attention to the management of innovation and management training?

(Mr Rosenkranz) I do not know. I have been to a business school.

1878. Did they teach you much about management of innovation and technology?

(Mr Rosenkranz) It was useful. In that area, I would say that is not the case.

1879. How big in numbers is Edwards High Vacuum? How many do you employ?

(Mr Rosenkranz) Worldwide, it is about 2,000, of whom 1,200 are based in the UK.

1880. Of those, roughly how many are professional engineers and scientists?

(Mr Dennis) Between 150 and 200 engineers scientists.

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Mr F D ROZENKRANZ  
and Mr N DENNIS

[Continued]

*Lord Kearton*

1881. Do you take people on sandwich courses from universities?

(*Mr Dennis*) Yes, and they are some of our brightest people.

(*Mr Rosenkranz*) We find it very useful indeed.

*Chairman*

1882. Do you see any role for government in helping you or industry generally in encouraging greater innovation to increase turnover and our share of world trade?

(*Mr Rosenkranz*) I do not know how one does that. For example, we set about getting ourselves a market position in the US and Japan. Japan accounts for one-quarter of our sales now. We do make certain things in the US, but 35% of our sales take place in the States. At a rate of \$1.50:£1 the US is quite attractive; at \$1.80:£1, given our cost base, it is not, which means we might have to export manufacturing. In Japan, nobody ever said the yen would go the other way, but it costs us £350,000 for every five yen, and it has moved from 225 to 270 in a matter of four months. If you go on for a period of a year and a half, a company of our size has to find £5m of operating profit to break even. Can the Government do anything to control the economy?

1883. You are talking of stable exchange rates?

(*Mr Rosenkranz*) Yes. That would help us more than anything on investment, innovation and everything else. We want a stable exchange rate instead of what we have been having in the last few years.

*Lord Gregson*

1884. You can insure against exchange rate risks or variations, as most companies do?

(*Mr Rosenkranz*) That is true, but if you are in a market like semi-conductors where your sales can drop to two-thirds over a few months and you sell off the shelf and you sell forward for two years you can be cleaned out.

1885. You can also make money on it the other way round?

(*Mr Rosenkranz*) It depends. You will not get any medals from BOC for entering the financial market—rightly so.

*Chairman*

1886. What about help in absorbing risks by offering grants or any kind of help to encourage innovation? Do you see any role for government in that area?

(*Mr Dennis*) That is a very, very difficult question, in the sense you have to make sure you are not funding companies which are lame ducks. It is

true it is very difficult to get funding for long-term investment, as the Japanese and Germans do. Obviously, you must see a profit arising in the company, and a three to five-year horizon is about the maximum for the purposes of new investment, and even that is a bit too far away in some cases.

1887. Do you feel at a disadvantage with your competitors in the way their governments help them?

(*Mr Dennis*) Definitely with regard to the Japanese and Germans, yes.

1888. Can you give us a run-down of how you see the German government helping German industry which makes it more difficult for you to compete?

(*Mr Rosenkranz*) It is not just the German government; it is a matter of German culture. I am no expert on German companies, but their capital structure is different; they have lower interest rates; there is less pressure on the short-term. BOC publishes its results every quarter. In Japan and to a lesser extent in Germany there is a hidden agenda. To take Japan as a very good example, we now have 15 competitors for our dry pump. That is our main market, and we export to Japan. To some of the main Japanese companies we are almost closed off. We may have a relationship; the engineer will like it, or it comes from the top. Because the micro-electronics industry of Japan is now the most successful in the world we have some really tough issues on our hands. Technically, we have the best product. We could improve in other areas because we are not perfect. However, the blatant comment was made to me, "They are Japanese. We will work with them because we have a relationship, and even though their product is worse than yours by working with them they will become better so they can get to the end user." That is very tricky for us when dealing with a technical product. The real meat of it is: How does the thing work in certain applications?

1889. They definitely favour Japanese products because they are Japanese, not because they are better?

(*Mr Rosenkranz*) Absolutely.

*Lord Kearton*

1890. How do you protect your product in Japan? How do you make sure it is not copied?

(*Mr Dennis*) Primarily, by patents. The patent process in Japan is very lengthy; it could take up to five or ten years before getting anywhere if somebody infringed.

*Chairman*

1891. Is there anything the Government or legislation can do here to help?

(*Mr Dennis*) I very much doubt it. The Japanese patent situation is similar to our own, but it is very



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[Continued

[Chairman *Contd*]

heavily overloaded, and great pressure has been put on it, particularly from the US, to try to improve the situation. If there is an infringement, it can take you up to ten years before you prove your patent.

1892. As I understand it, the fact that Japanese companies prefer other Japanese companies' product is nothing to do with government; it is part of the ethos of Japanese companies?

(*Mr Rosenkranz*) I call it a hidden agenda set up by MITI setting out the areas they will go into, and you end up with either formal or informal collaboration, relationship—call it what you like. We put an awful lot of energy into Japan. Our little company is worth %—or 1 200th—of UK exports to Japan.

1893. Would you like to see our DTI moving a bit more towards what MITI does to help this kind of thing, or do you not think it is relevant?

(*Mr Rosenkranz*) I am not sure it is possible; I do not think we have a strong enough economy to do it.

*Lord Kearton*

1894. BOC is itself in Japan in quite a big way, is it not?

(*Mr Rosenkranz*) Yes.

1895. You have a big brother to help you?

(*Mr Rosenkranz*) It does not work that way.

1896. Do you sell through agents? Do you have Japanese staff?

(*Mr Rosenkranz*) It is a long story, but essentially we have a 50 50 joint venture. After three years of difficulty, we are about to get the majority of it. It was an old arrangement set up on the basis of 50 50 with the other partner having control. After some quite difficult times, we have now agreed that we will have 60 and they can have 40, so theoretically the management comes to us. Now we have to learn how to manage it. I hope the situation will change.

*Chairman*

1897. Although you are part of a big group, you are a representative sort of company in the electro-mechanical field. This country has an enormous balance of payments deficit because we do not make enough of the things we need and do not export enough. Would you care to make a general comment on how you see that problem as a whole from your standpoint and experience?

(*Mr Rosenkranz*) It is a difficult question because we do not want politics to come out. I think our infrastructure in manufacturing is dangerously low and dangerously narrow. You go into Crawley and all you see are warehouses. If you go to a new area where it is said there are new factories, they call

themselves factories, but they are just importers. Therefore, anything you buy in you are buying in from a contracting industry.

1898. Your parts?

(*Mr Rosenkranz*) We make nearly everything ourselves, not only because we think we are better at it, but often because we cannot get them elsewhere. For example, there are very few places where we can buy motors. I should not say this, but if Lord Weinstock looked at the business, and found that particular area did not make enough profit and he chopped it, we would be vulnerable.

1899. Because there is no other source of supply?

(*Mr Rosenkranz*) It is more expensive and it is not quite suitable. I am just giving an example. I know we have all these new micro-electronics companies set up by the Japanese; we are quite good at televisions and have a good car industry. I am not an economist and do not know the numbers, but I would like to think that in five to eight years we will have a strong car industry; and we might have a strong television industry. That is the hope I have, but if you ask about the narrow slices now and in the next few years as a chap from industry I feel the situation is terribly dangerous.

1900. The problem is the narrow base of our manufacturing industry now; there is difficulty in getting the right sort of components?

(*Mr Rosenkranz*) That is right. Our competitors have a large home market; we have a contracting one. Although we do not have an obvious hidden agenda, in Britain people like something from abroad if it is better. Even so, in Britain whatever it is you still have a better chance than if you are a German company given the relationship, the language or whatever. One of the biggest things we did was to go for exports. Our UK market could not pay for the development.

*Lord Gregson*

1901. Is it not interesting to look at Switzerland which has practically no home market for its engineering products, and yet it has one of the best engineering industries in the world? Can you not draw something from that situation? They have no home market and have to trade on an international level all the time, and yet they are doing very well?

(*Mr Rosenkranz*) I do not know enough about Switzerland to be able to say.

1902. There are lessons to be drawn from it.

(*Mr Rosenkranz*) We try; we have gone about it with exports. We make a lot more ourselves than perhaps we would like, but that is the only route available, short of manufacturing overseas.

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[Continued]

[Lord Gregson *Contd*]

1903. You are succeeding. Why should other people not succeed?

(*Mr Rosenkranz*) I think we would have been against the wall if we had not had a parent to pay the bills back in the early 1980s.

*Chairman*

1904. The parent company took a long-term view?

(*Mr Rosenkranz*) Yes. I know I am paid by BOC and I am a BOC person, but I actually take my hat off to the board. We went to the board for a great chunk of investment; they listened to the case and gave us the money.

1905. And they took a long-term view on pay-back?

(*Mr Rosenkranz*) Yes, which I think was very commendable.

*Lord Whaddon*

1906. You mentioned the narrow base of British manufacturing industry, about which we are very concerned. Whole chunks of industry have gone. You almost went but you survived and surged ahead. You mentioned two factors which helped: one being the support of a large group and the other was a deliberate decision to go for export markets. Is that the real reason why you have survived and those other chunks of industry did not, or are there other factors?

(*Mr Rosenkranz*) Clearly, one had to restructure the business totally. A lot of people tried to do it. You try to get rid of some costs; you try to restructure; you look at your marketing; you try to see what is good and build on it; you cut out what is bad. It is quite a big process, and a lot of things come together in order to bring the business together. But in the case of the pump being exported to Japan, we could end up in a lot of trouble in two years, because it accounts for a large part of our market. The incremental profit is always high with products like ours because of high development costs. It is very easy to lose it, and it will not be just bad management. We are aware of the problems and are trying. I do not think it will happen totally, but the risk is there. I do not think there is an easy answer to what you can do.

*Chairman*

1907. What about your relationship with your suppliers? You have described the problems of the narrowness of the base. Do you keep in touch with your suppliers? For instance, if you want a new type of bearing, do you go to them and say, "I am going to need this, and I am letting you know now so you will be able to supply it when the time comes"?

(*Mr Dennis*) We have done much more of that in the last few years; we are tending to involve our

suppliers in terms of our requirements and our customers in terms of their requirements. We are getting a technological relationship with some of our large customers.

1908. It is a healthy trend?

(*Mr Dennis*) Yes, and it comes down to quality. If you are to make a quality product you have to be satisfied that your supplier is the right sort of supplier for the product. If you are looking at ISO 9000 or BS 5750, it all leads to doing work of a certain standard. You have to work with suppliers and customers on this basis. In a few years it will be very rare that you will not use a supplier you are very happy with and who conforms to BS 5750.

*Lord Gregson*

1909. Is it true to say that all your suppliers are qualified?

(*Mr Dennis*) We are qualified for AQAPI; for electrical and mechanical equipment and AQAPIS for software, and we use these at the moment. We have yet to qualify for BS 5750.

1910. You cannot qualify them in turn?

(*Mr Dennis*) No, but we will do it before 1992.

*Lord Erroll of Hale*

1911. You referred to the dilemma over the supply of electric motors. You said that if GEC found they were not making enough profit out of it they might cut them out. Would you not find it advisable to have one or two other suppliers to guard against that eventuality, because you might get better electric motors? In the last resort, you might import them from another country. Surely, GEC do not have a monopoly on the sort of electric motors you use?

(*Mr Dennis*) There is only one other supplier of small electric motors in this country which we can use, that is, Brooke, Compton & Parkinson, which is part of Hawker Siddeley, but those motors are not as good as GEC's. If we went abroad, we would probably have to go to Brown Boveri, AEG or Hitachi. Japanese motors are generally very expensive. As regards American motors, one supplier is Leeson's, but the Americans seem to have a problem in manufacturing 50Hz motors; they make 60Hz motors. Therefore, we are really tied to Europe.

*Chairman*

1912. At the moment, the arrangement is satisfactory but it is linked to one company?

(*Mr Dennis*) Yes—GEC.

(*Mr Rosenkranz*) I am just trying to explain that before there used to be a number of people to whom we went and the number is getting less. Another area in which we buy a lot of products is castings. The



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[Chairman *Contd*]

castings industry is not the most high-tech industry, but our relationship with those suppliers is one where we have an expert who goes around helping them to improve their product and quality because we know they are not going to do it and it is a key product as far as we are concerned. We see that as the only way to get out of a problem. We try to do it by having a good relationship in which we give long-term contracts and hopefully it makes for a more sound product.

*Chairman*

1913. You are saying that that base is also contracting. There used to be scores of companies in the castings field; now there are half a dozen?

(*Mr Rosenkranz*) Yes.

1914. I think we have covered the main issues. It only remains for me to thank you on behalf of the Sub-Committee for coming to answer our questions so clearly and fully. It has been very helpful to have an example of your sort of company—and a successful one at that.

(*Mr Rosenkranz*) Long may it continue.

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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 17 October 1990

*The Lord Roll of Ipsden and Mr P Stormonth-Darling*

ELECTRONIC COMPONENTS INDUSTRY FEDERATION

*Mr D Kynaston, Mr D Edwards and Mr R Bullock*

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WEDNESDAY 17 OCTOBER 1990

Present:

Bruce of Donington, L	Flowers, L
Butterworth, L	Kearton, L
Caldecote, V (Chairman)	Taylor of Gryfe, L
Clitheroe, L	Vinson, L

### Examination of Witnesses

THE LORD ROLL OF IPSDEN, a Member of the House, examined, and MR PETER STORMONTH-DARLING, Mercury Asset Management Group plc, called in and examined.

*Chairman*

1916. Good afternoon, Lord Roll and Mr Stormonth-Darling. We are very grateful indeed to you for coming along. I wonder if I might start by asking a question which is the result of a recent visit that three of us paid to Germany. There we had a visit to a private bank which was, as we understood it, something a bit between a commercial bank and a venture capital company. We have nothing quite like that here, I think. One point that they made was that it would be acceptable for a German quoted company in manufacturing to pass their dividend and spend the money instead on product development or R&D; and they said that would not cause any serious problem in the markets there and the company would not be in any danger from doing that. I would like your comment as to whether you think that might be rather different in the United Kingdom.

(*Mr Stormonth-Darling*) I think it would be different in the United Kingdom. I am not sufficient of an expert on the German market—although I do follow it—to know whether that assessment is entirely right. I must say I would be a little doubtful that if a German company were to cut its dividend totally it would not have some adverse effect on the share price, but so far as the United Kingdom is concerned, whilst I would hope to make the point that institutional investors (and I represent one of them) do very much favour investment by companies in research and development—I think there is quite a lot of evidence that supports that—equally I think that we probably would be a bit shocked and alarmed if the dividend of the company were to be sacrificed entirely for that purpose. Nor do I quite see the need for it because I think there is capital available.

(*Lord Roll of Ipsden*) It would be interesting to know, my Lord Chairman, what the share ownership structure of that particular company was. I think that might well have an important effect. If, for example, the Deutsche Bank had 25 per cent, the Dresdner Bank had 24 per cent, and the Commerz Bank had 20 per cent, that is one situation. If they were very widely held in the stock market I think the situation would be very different.

1917. I think that is a very fair point. I think it is probably very likely that the shareholding would be more of the first type you describe than the second. But if that type of shareholding leads to more effective investment in product development,

therefore greater turnover and bigger market share, is that something we ought to consider as being more beneficial to the economic prosperity of the country than our system?

(*Lord Roll of Ipsden*) Looked at just like that, the answer may well be yes. But, on the other hand, it is a little odd if a company should find itself in a position where it needs to cut the dividend abruptly in this way, presumably after a history of fairly regular distribution of dividend over some years—if it is a company that is dependent on research and development in that sort of field—in pharmaceuticals, engineering or whatever, because it is suddenly faced with a need for research and development expenditure which makes it necessary to do that. To my mind, that would throw some doubt on the strategic management of the company.

Chairman] I think it can occur very easily when a company has got behind and has discovered it has a serious problem.

*Lord Taylor of Gryfe*

1918. I was present at this discussion. The other point which follows on from this particular question is the relative absence in the German market of contested bids. The fact that a company had spent a little more on research, even at the expense of dividend, did not make that company a target for take-over whereas the implication of a company passing its dividends in this country would be an immediate drop in their share value which would make them vulnerable to possible take-over. Now, if German industry is more protected from the kind of active market that exists in London, is this a factor that enables them to be more relaxed about spending on R & D even at the expense of dividend?

(*Lord Roll of Ipsden*) I am not sure that there is a direct relationship between their being less vulnerable to take-over bids and the question of R & D and general attitude to R & D. I think the lack of vulnerability to take-over is a fact in Germany, there is no doubt about that. I would put it rather differently; I would go so far as to say from the point of view of perhaps desirable industrial restructuring, that it is almost impossible at times to penetrate German industry, even if you have an extremely interesting and extremely good proposition, particularly if it requires some cross-border take-over. But that is again due very much to the ownership structure of German companies and the tremendous power which the big banks have (a) through their shareholdings and (b) through their presence on the



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[Continued]

[Lord Taylor of Gryfe *Contd*]

supervisory boards of German companies. If you look at Siemens, Daimler-Benz, or Hoechst, you will find a whole array of big bankers sitting on their boards. Here, if anything, it is rather the other way round.

Chairman

1919. Would you think there would be advantages in investors in companies taking a closer interest in companies rather than saying "We will sell our shares to a take-over bid if we are not satisfied with the management"? Would it be better that investors go to the company, as I think happened in the case of Vickers some years ago, and say, "We don't like the present management. You have to do something about it or we will"?

(*Lord Roll of Ipsden*) I ask Mr Darling if he would like to answer that. It was a question first raised, if I remember rightly, in public many years ago by the then Governor of the Bank of England, Lord O'Brien, who pointed out that moving with your feet by such people was perhaps not the best way. Peter, what do you think?

(*Mr Stormonth-Darling*) I think it is called "voice, not exit". In other words, institutional investors should exercise their voice in companies in which they have big shareholdings and express their views more forcefully, and even try and change management, rather than just sell their shares. I personally am just a little bit cautious about this route. There are occasions when it could happen, should happen, and does happen, but they are very small in number and I think the main reason for that is that the skills that make a good fund manager are simply not the same skills that make a good industrial manager.

In other words, we as fund managers, make no claim to know how to run somebody else's business. We do not have those skills. We are entirely a different type of person. Even when it comes to the point of trying to change the boards by putting on additional or stronger non-executives, I am not sure how good we are at that manipulation process also. So I am a little cautious of this "voice not exit" route. The other thing is that before the fund managers all get their act together it is probably already too late. One fund manager will spot a company going downhill perhaps at an early stage but by the time the whole group of us have got together in spotting those weaknesses in the management and its under-performance and deterioration, it is probably already fairly late to do those changes. If you take the example of Distillers, I think they had reached that point before a number of the institutions altogether were exercising a voice, but it was too late and at that point a takeover of Distillers was probably the right thing to happen.

1920. Nevertheless, the Germans seem to be quite good at doing that. The bankers in Germany seem to be quite good at spotting when something needs to be done?

(*Lord Roll of Ipsden*) That may be the good aspect of the preponderance of bank people on the advisory boards. They may not be very good at running an electrical company but they probably can detect weaknesses in the *Vorstand*, the managing board, at an early stage and then, since it is a very closely-knit community in Germany, they can probably manipulate it, as my colleague put it, and produce some changes.

1921. Would you then favour some move in that direction in this country to the supervisory board to obtain that sort of knowledge?

(*Mr Stormonth-Darling*) I personally would not. First of all, I think so far as Germany is concerned, they, if anything, are moving closer to the United States United Kingdom system of corporate governance and a broader, more pluralistic stock market. The same is also true in Japan and I think the causes for under-investment in very high technology, long-term, new plants, etc. do not allow for that method of corporate governance. I think there are much wider, broader and very complex explanations for the shortage of long-term investment. So I do personally think that would be tinkering with the wrong problem. I think if anything in the next ten years we are going to see the German corporate governance situation come closer to ours rather than the other way round.

Lord Kearton

1922. From quite a lot of the evidence we have had the impression that the company's function is purely to increase dividends. If companies increase dividends year by year, the end result is that we are now paying out in dividends a higher proportion of earnings than ever before, higher than the rest of the Community and higher than any of our industrial competitors. A figure quoted recently was 65 per cent paid out in dividends. Do you think this trend by companies encourages investment and innovation?

(*Mr Stormonth-Darling*) It is the other way round, that they decide to pay that in dividends to shareholders because they do not have an investment programme on a proper basis that we would like to see.

1923. If this is a universal attribute across the whole spectrum, it is a bad outlook for the country.

(*Mr Stormonth-Darling*) I think it may be a bad outlook. There are a whole range of factors and I do not think paying a higher percentage in dividends is depriving those companies of capital needed for investment because should they need greater investment that would be welcomed by institutional investors. So in future they go and see whether or not that one prefers dividends or wants to do this, that and the other, and whether they have a good strategy.



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[Continued]

[Lord Kearton *Contd*]

1924. Is this why we have ICI cutting off £100 million of its capital investment programme? It will not cut the dividend?

(*Mr Stormonth-Darling*) I do not think they would have done that in order to pay their shareholders a higher dividend. They must have had some macro-economic factors in particular which caused them not to make that investment.

*Lord Taylor of Gryfe*

1925. Is capital investment very much regarded in some companies as an optional extra which can be cut without dividends being jeopardised?

(*Mr Stormonth-Darling*) It perhaps could be in some instances but I stick to the view that the responsible pension managers here and elsewhere want to invest in companies which have a long-term strategy for growth. They want to invest in well-managed companies and want to hold those investments for as long as they possibly can. The old saying goes, "Buy the right shares, hold them and live to be 80." Perhaps it should be 90.

(*Lord Roll of Ipsden*) Certainly.

(*Mr Stormonth-Darling*) But this is the way that we, as fund managers, are looking for investments. After all, a typical pension fund in the United Kingdom is holding at any given time something between 70 and 80 per cent. of its pensioners' money in equities, because we have concluded that equities are the right way for us best to provide returns on those pension funds and the best way of meeting the objective of those pension funds, which is to out-perform wage inflation so that they can pay the pensions, and if we have at any time 70 to 80 per cent. in equities—some of those are, of course, overseas equities but more than 50 per cent. of the portfolios are typically United Kingdom—we cannot forever be jobbing in and out on short-term considerations. We are looking to find good, long-term, well-managed British companies we can buy into and hold and they are stable and those are the ones that have proper investment programmes by and large.

*Lord Butterworth*

1926. Those of us who visited Germany were greatly impressed by the way in which the Federal Government and the Lander have successfully stimulated a high regard for research and this was a thing that was understood by the general public at large. Of course, one realises that the system of Federal Government and Lander is so different from ours but what steps could a British government take in order, so to speak, to generate in industry, among scientists and, indeed, amongst the general public, that regard for and understanding of the importance of research and innovation?

(*Lord Roll of Ipsden*) If I knew the answer to that, my Lord Chairman, I would shout it from the housetops! I think it is historically a very long story and there are very many things. I imagine your Committee must have gone into this at great length.

You do not need me to tell you about it, but based on my own experience I fully endorse what you have said about the impression of Federal Germany. Every time I go to Germany I am impressed with it. I go to the Siemens *Bankentreffen* (as they call them) and they have their bankers there from all round the world. There are not all that many but I am impressed by the tremendous emphasis on research from all sides. There is usually somebody there from the government, somebody from the Central Bank, and there is no difference at any time between the management of the company, the bankers, etc. They all say the same. Why that is not so here I do not know. I suppose to some extent—I am not saying this is necessarily a major factor—this is because of the economy measures in recent years, including what some people would call the parsimonious attitude on the part of Government departments. I am not saying the Government should itself always be the provider of funds for research but obviously in all societies it must be a very important provider of basic research and research related to defence, which have obviously a fall-out for other uses, and less expenditure must have had a depressing effect, I am sure. The idea that industry automatically steps into the breach I do not think holds. It cannot do it.

But, as I say, it is a very long story. If you will allow me, Lord Chairman, just to put a little footnote on the dividend question, although I do not dissent from what Mr Darling said and would not for one moment say that it is actual or perceived or imagined pressure on the part of fund managers that makes companies distribute dividends in excess of what they from a strategic point of view ought to do—I do not think that for one moment, nevertheless I must say, having not always been in the City (it is some 25 years since I came into the City), I have been impressed by the extraordinary attention that is paid to the level of dividends, both in boardrooms and, of course, even more so outside, I do not think because of the effect of institutional fund managers and institutional investors—it may be that the media have created a certain excessive interest in that matter—but I think it is a fact that here managers as well as the public do pay a great deal of attention to the dividend. You have headlines—"So and so drops its dividend". Probably in Germany this would pass relatively unobserved.

*Chairman*

1927. Is not the pressure for quarterly improvements in the league table of what fund management achieves an important factor?

(*Mr Stormonth-Darling*) No, I do not really think it is. It is true, of course, that we are evaluated every quarter, but that is really just the scorekeeper telling us where we are. In practice the so-called benefit consultants who produce these quarterly measurements and generally counsel pension fund trustees on how they should get their money managed, and whom they should appoint, do not in our experience tell trustees to get rid of a fund manager who may



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[Continued

[Chairman *Contd*]

happen to under-perform over a period of one year or two years, something like that. I think it is wrong to blame these quarterly measurements. In my opinion, it is rather like blaming the scorer if your side is out for a low score. I think you have to have accountability, you have to have knowledge and information as to how the various funds are doing. In practice trustees do not get rid of fund managers that quickly. I would say this, that if a fund manager under-performs both in relation to his competition and the general level of the markets in which the funds are invested and by which they are measured over, say, a three-year period, he is probably terminated—I also believe he deserves to be. I do not think that happens on a one year view or even a two year view, so I do not think that the right target is the quarterly comparisons. I read this morning briefly that the Innovation Advisory Board are focusing on that. I think they are down a wrong alley on that one.

*Lord Kearton*

1928. I would say from their own terms of reference the pension funds have been extraordinarily successful. Nearly all the pension funds one reads about—nearly all the funded pension funds—are in fact in heavy surplus, so much so that a great number of companies are now on pension holidays. You might quite well find that about 15 to 20 percent of the declared profits are, in fact, monies paid back through the pension fund in surplus; you never see that extra money going to be used for anything else, if I may say so, than to maintain the level of dividends. There is never any question of an extremely good performance of the pension fund, which gives a surplus to requirements, going back into the business. In every case I have read of so far it has been done to prop up and maintain the dividends. Therefore, all the time you get the emphasis on “We are doing marvellously well today”. This Committee is very much concerned with how well will they be doing tomorrow.

(*Mr Stormonth-Darling*) It is quite correct that the British pension fund industry did extraordinarily well in the 1980s, the average return was about 20 percent. They are all going to do, I would say, much worse this year, and who knows what the 1990s hold in store? It is a period of great uncertainty. We do not know. We stick to our fundamental view that we should invest the great majority of clients’ money in the equity market and stick there as longterm investment. So far as the pension fund holidays are concerned, it is perfectly true that the majority of companies have not been giving new money to the pension funds for several years now. In some cases they have been able to claw it back. How they use the money is surely a matter company by company. I do not know that there is a generalisation one can make that they all pay it out in high dividends. I have not heard that before.

1929. There have been many cases where it has been used specifically to maintain the pay-out ratios. I have yet to read of a case where they say an unexpected windfall enables them to invest in R & D on a bigger scale than before.

(*Lord Roll of Ipsden*) I certainly would not be in a position to deny what Lord Kearton said. It may well happen. I have not studied it. This may well be the case, but then who is to remedy that? It cannot be for the fund manager.

1930. It comes down surely to the culture of the community of business and the City and so forth. One of the other teams which the Chairman led went to Italy, and there what we were struck by was the *elan* of the industrialists, the *joie de vivre* and get-up-and-go attitude which we found everywhere. That is lacking here.

(*Lord Roll of Ipsden*) I can tell you my colleague here gave me a brief on this this morning. He has a list of what we call the real culprits. Perhaps he would give it to you.

*Chairman*

1931. Could you expand on your views as to how we might improve things?

(*Mr Stormonth-Darling*) My basic proposition is that, if we define short-termism as the failure of industry to invest in R & D and other desirable longterm investments and say it is the financial markets that are to blame, I think that is much too simple and indeed an erroneous charge. I think that the first thing is there is undoubtedly a perception to that effect. I accept that to the extent there is that perception there is a problem because some company managers operate on this assumption—I think a minority, but there are some. I think the objective truth lies in that there is not a short-term bias in the pricing mechanism of the stock market. One should ignore what one reads in the media, the great attention focused on short-term quarterly results of companies, half-yearly results of companies and, indeed, also the attention that stockbrokers’ analysts place on these things. One should look at actual behaviour of the stock market. If you do that, you find that there is not a short-term bias in pricing of different shares. If anything, it is the other way round, rather an extreme longterm bias. There is much academic study on this subject. If I could put it in my rather simplistic terms, take a share like Wellcome which sells today at 20 times its after-tax profits and gives the shareholder a dividend yield of 1.7 percent: clearly when you can put your money to work in cash at 14 percent, the investor who is buying Wellcome at these prices is not looking for a short-term return but is looking for an extremely longterm return. Now I go the other way: if you take a company like Burton, which is generally thought by institutional investors to be the ultimate short-term company, it has always tried to maximise both its short-term profits and its short-term dividend, and it does this through all



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sorts of means, not the least of which is by making acquisitions and, because of acquisition accounting rules which are pretty flexible, you can increase your profits, but you have to go on making acquisitions in order to do that. It is a very bad strategy, the market may take a year or so to suss it out but suss it out it does. The consequence is that Burton's shares sell at five times the profit and their dividend yield, if they keep the dividend up, is 15 percent, but the main thing is that the share price has gone down and down and down. That is why the dividend yield is so high. So I actually feel it is wrong to blame the stock market mechanism and pricing system for industry short-termism. I think there is a whole raft of other factors. I am happy to mention what I think if you would like me to.

1932. You agree it is a problem we face that manufacturing industry in this country does not have a big enough share of world trade, and that we import too much and export too little and have a monumental balance of trade deficit?

(Lord Roll of Ipsden) I certainly agree with that.

(Mr Stormonth-Darling) I do, absolutely.

1933. If we go directly on from that, could you give us some idea of how you feel that could be improved? That is not the financial institutions' fault, is it?

(Mr Stormonth-Darling) I think the fault lies in several different directions. First and foremost, I believe, is the cost of capital, whether you take it on a real cost of capital basis or on a notional. If I take the notional cost of capital as roughly 14 or 15 per cent., if a company is considering a major new investment—ICI, Courtaulds or anybody else—they must be looking for a return in excess of the cost of capital and so I think they would typically in the United Kingdom today be looking for a return on the new investment project of 17 or 18 per cent. or even higher and I do not honestly know where they are going to get it. With the possible exception of one or two startlingly successful companies like Wellcome in the pharmaceutical industry, I think our typical manufacturing company is not going to find that rate of return available in the United Kingdom. If you compare the true real cost of capital, taking into account tax factors and so forth, as between the United Kingdom and Germany and Japan, there again I think you will find the cost of capital is much lower in those countries than it is here, both the notional rate and the real rate, and I feel that the Germans and the Japanese—we are always held up against the Germans and the Japanese—they have it so much better. One thing is that they have had low inflation all these years and low rates of interest and I think it has been much easier for them to invest in long-term projects. That is the first thing I would say. The second is general macro-economic factors. I have already mentioned inflation but volatile economic prospects, stopgo policies, volatile currency movements—these have also been factors and thus the lack of attractive

prospects in this country, the lack of attractive and profitable prospects, because there is no point spending money on R&D unless you are going to make a profit, and also the low productivity that we had in the United Kingdom about six or seven years ago, since which time there has been a great improvement in productivity—in fact, the fastest rate of improvement anywhere, and, incidentally, it has been accompanied by a substantial increase in investment in long-term projects. Thirdly, we have a raft of, shall I call them, for lack of a better word, “cultural factors”—education, general education, which may not have been sufficiently directed at the scientific, engineering, etc. and also specific education in the fields of business management and, indeed, added to that, weaknesses in the labour force, craft unions and other things which have blocked the steady growth of productivity until fairly recently. Then I would say the general attitude in this country towards a business career, and a great many of the very best brains in Britain have gone into other walks of life, into academia and government and law and so on. It is terrific for those professions but that has not been good for business. If you go back 100 years, even then we were under-investing relative to the Americans and others in our steel companies and so on. There is a lot of evidence to that effect. There is nothing new about this. But if anything, things have got a bit better in the last five years. Finally, I would mention management short-termism in companies because it is actually managements, it is not we who are financing them who are telling them whether they should invest or not. That is their decision. They are the ones who are not investing. So one has to look at why management is not investing and I think there are some factors there that are worth considering. For example, in the remuneration of senior managers today there is a heavy element of annual cash bonuses which are tied to the results this year, and they have a terrific incentive, therefore, to maximise today's profits as against five years down the road. Similarly, if you have a company with a lot of subsidiaries scattered around, both within the United Kingdom and overseas, that fellow wants to look good, the manager of the local subsidiary, wherever it is, and also he wants to get more money in to add to his investment in his area, and the best way he can do that is to maximise his short-term profits. So there is also management short-termism. So there is one little thing there, cash bonuses, which I personally believe to some extent should be replaced, to the extent that this is possible, by long-term stock options which do give the management people the same economic interests as the shareholders and, indeed, the country, if we believe in long-term investment. I think for the first time in the last year the tax differential between the tax a chap suffers when he exercises a stock option and when he receives an additional cash bonus is the same. It is 40 per cent. on both. It used to be different. Perhaps there is some case for restoring financial incentive to stock options so that we would



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not have this obsession with short-term bonuses. But personally I think the most important factors are the cost of capital and the need for an economy that gives prospects for stable and low inflationary growth.

1934. On the cost of capital, I am sure it will be a very important one but I heard yesterday from the head of a company which had had this criterion of new investment, a two to three-year payback, which was then taken over by a French company who tore up those criteria and said, "Very well. From now on there should be a ten-year payback. Two years for the development of a new investment engineering project is unrealistic."

(*Mr Stormonth-Darling*) It sounds like a rather extreme case, but I think the only possible justification or explanation for that would be somebody saying, "At these rates of interest I must have a quick return or we do not do it."

1935. Then we have a circle we have to break into. We have high interest rates, and we have to deal with inflation, and inflation is one of the problems for investment. How do you break into this sort of circle, because to my mind the lack of output of manufacturing industry is one side of the inflation equation and one has to get going again, and the other is high interest rates?

(*Mr Stormonth-Darling*) It is a circle, yes.

*Lord Vinson*

1936. You say the cost of money is one of the fundamental causes and effects of our under-performance and I think this squares with quite a lot of other evidence. But at the end of the day we want some ideas as to what to do about it. It seems to me our accountancy profession has quite a lot to answer for in sometimes painting too optimistic a picture of company profits. Also if your cost of capital is high one of the ways you can help yourself is to amortise that investment as quickly as possible, because the whole point of investing in the new project is to get your product on the market and be in a position to reduce your price as quickly as possible. This calls for an amortisation policy that is as rapid as possible. We used to have a system of free depreciation. There is nothing free about accelerated amortisation. It is a badly misinterpreted term but it seems to me we should favour the concept of allowing companies to amortise at the rate they think is sensible—and I would put a rider here, the same rate as they use in their published accounts, so that we do not have the twin-column accounting—and that would in fact reduce the cost of capital because it allows for a much quicker write-off and much quicker pay-off against self-generated profits. So would you think there is any merit in advocating that as part of the solution—not a full solution but at least something that would ameliorate the cost of capital and, therefore, encourage more risk-taking and innovation and also, which is what we are

talking about, that a return to a free choice in amortisation with no provisos would be a possible part of the solution to meet the very high cost of capital we have today?

(*Mr Stormonth-Darling*) Yes, sir. I very much feel that. I remember in the USA a number of years ago when they wanted to give a spur to investment they had a hundred percent write-off you could take if you wished. I cannot see the slightest argument against doing that if that is where our objective lies. So far as the institutional investor is concerned, you might say that would penalise the profits, they would all start jumping up and down saying "Oh, dear, oh dear". No, not a bit of it, they would be delighted. They also look at the cash earnings, including depreciation. I think that would be a very good idea indeed. If I could pick up on Lord Butterworth's earlier question about how to encourage a better public perception of R & D, I am not sure that I can quite answer that one although I may applaud what Lord Roll said. But there is one other thing in the tax area which might be worth considering here, which is tax credits for companies for research and development expenditure and that would give encouragement to companies to do it and it would also demonstrate the fact that the Government thought this was a good thing. I think that would be perhaps a step in that direction. I also see in the Innovation Advisory Board's paper today (which I have not had time to read fully and I certainly do not agree with all I see in it) that they have some good ideas and one is the idea of the R & D scoreboard, a publicly maintained record as to who was doing what R & D. That is not a bad idea either. But I think your idea about accelerated depreciation is absolutely on the spot.

*Chairman*

1937. Does your first point on investment mean you spend £100 and get tax relief on £125?

(*Mr Stormonth-Darling*) Possibly something like that.

1938. My understanding is that that has often been suggested and the Treasury has said that experience and research have shown that in Australia, for instance, when they did that that relief of tax has been wholly ineffective.

(*Mr Stormonth-Darling*) Again I think that, when one says what is to blame for such and such a policy being ineffective, one may not take account of all the other reasons why people in Australia do not want to make longterm investment. They have had even higher rates of interest and even higher inflation for most of the last five years than we have had here.

*Lord Taylor of Gryfe*

1939. You are under pressure inevitably to perform as fund managers. I sat on the board of trustees of one of the larger ones and we got these quarterly assessments of performance which led

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some people into rather silly investments in works of art and things of that kind. But do you take any care to have a number of trustees of major pension funds from the shop floor? Frequently they are trade unionists and shop stewards and so on. I have often wondered whether you might get a greater understanding of your problems, including the acceptance of longterm investment, if some trouble were taken in the City to take these chaps from the shop floor and educate them on the responsibilities of trustees in pension funds so that they understood the market, so that they understood your kind of problems and pressures. Do you feel enough is being done in that area?

(*Mr Stormonth-Darling*) I am sure more can be done in that area but my impression is that the shop floor representatives of the trustees whom we meet are extremely well informed, they ask the most probing and difficult questions and have an acute interest in the welfare of their pension funds and, after a while, a very good understanding of the stock markets. I do not think either that they specifically, or trustees of pension funds in general, have a responsibility for so-called short-termism because I do not actually believe financial short-termism exists to anything other than a very minor extent. Incidentally I am rather interested in your remarks about the works of art because that, of course, was longterm investment. The only pension fund I know of that did that was British Rail. I do not know whether you are suggesting they did that so that they would not be subjected to the short-term question, because nobody could say they had to realise those investments quickly.

1940. But it did not greatly help manufacturing industry.

(*Mr Stormonth-Darling*) And it did not really help the pension fund either.

Chairman

1941. Could we come back to the point of take-overs? It has been said that the pressure for take-overs is too much in favour of the bidder. How would you react to this proposition as far as manufacturing companies are concerned, and the criteria as to whether an opposed bid should be allowed and not referred to the Monopolies and Mergers Commission when it appeared that the turn-over of the combined company would be greater than the sum of the turn-overs of the two companies being put together. If we are really interested in increasing output of manufacturing industry, so often it appears from a proposed take-over that the bidder does not have much interest in increasing the output of the joint company but rather of selling off assets to make money profits.

(*Mr Stormonth-Darling*) I think the last point you make is true of certain notorious or well-known bidders like Hanson which is very interested in redistributing assets, and they are extremely

professional at that. They have been very good at extracting additional value from the assets they acquired, but I do not think they are particularly typical. I think on the whole when companies are taken over the idea is to keep the majority of the assets of the acquired company and try to develop it further. But on the generality of take-overs, my view - it is only my view—is that a relatively free market in take-overs is desirable. I have never been persuaded of the arguments that take-overs are such a bad thing.

1942. Opposed take-overs?

(*Mr Stormonth-Darling*) All public companies will by definition be opposed take-overs because if you are about to be acquired—what is sometimes called the target or victim company—you owe it to your shareholders to oppose the bid in order to try and get a higher price and/or to send the bidder away. So I think all public companies will be opposed take-overs and contested today, you will not have such a thing as an agreed take-over of a publicly quoted company—an agreed take-over of a private company, yes, or a division of a public company. You have to accept that all take-overs in public companies now are contested.

1943. That used not to be the case?

(*Mr Stormonth-Darling*) I think that used not to be the case.

Lord Clitheroe

1944. Is that not the case in Europe in general?

(*Mr Stormonth-Darling*) You might be able to do a deal with a controlling bank beforehand. I am not sure that is necessarily in the interests of the minority shareholders who might have got a slightly higher price if it had been contested.

Chairman

1945. Do you attach importance to the argument that take-overs keep management on their toes? I think Lord Kearton knows this, that in Italy a lot of the companies we talked to were family controlled and they had no fear of take-over whatever, but they appeared to be extremely innovative, extremely on their toes and very fit.

(*Mr Stormonth-Darling*) I do believe that take-overs keep managements a little bit on their toes and I believe that take-overs, as Samuelson, the American economist, said in 1981, "eliminate the deadwood" because I think it is true, if you look at the take-overs that actually go through after a contest, that nine out of ten, I believe it is right to say—and possibly ten out of ten in certain conditions—are under-performing companies. A good, well-managed successful company with longterm strategy and good shareholder support for that strategy need not fear a take-over. You do not hear talk about fear of take-overs from those companies, you do hear about it from the ones that look



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vulnerable because of under-investing, only short-term profits, and everybody is beginning to see through them and the share price goes down. Where it is a good company, the communal voice of the institutional fund managers and others who vote their shares in one way or the other at the end of the contest will frequently favour the incumbent management. There is a high degree in this country of take-overs that do not succeed. I could give a long list—to name one, Pilkington's; Woolworth is another, and Higgs & Hill. So I feel there is a lot of justice here, that the companies that go to a take-over probably deserve that to happen. The good companies do not get taken over, with very, very few exceptions. Secondly, I think to compete in the great new world we are in, particularly the 1992 world, we need world-class and major and large companies. In this country, thirdly, I feel when a company goes into the public domain and gets its shares quoted, when it is out there in the stock market, it takes on certain privileges thereby—the right to raise new money through share issues, the right to use its shares in an acquisition, for example, and I think it also takes on certain obligations.

One of those unwritten obligations is that if you perform badly you are going to be taken over. It is a tough old world but that is the way it ought to be if we are going to keep our end up as you might put it. Then a final point on takeovers: overall takeovers benefit the shareholding community, which, of course, incorporates all the pensioners of all the pension funds in the country and from which a high percentage of the population benefits in one way or another, because the acquired company's share price has gone up 35 per cent. or 50 per cent. As to experience of the acquiring company share price, what happens to that afterwards is about "even-steven"; it is neither up nor down. So there is a net benefit to the shareholding community, additional wealth has been created, the pension funds benefit, the companies benefit from having to put less money into the pension fund, and so by and large there is not much scope for tinkering with the rules. I am personally rather against it, because by and large we need to have a takeover market in this country and I think the Germans and the Japanese envy our takeover market.

1946. I would not disagree that on the whole takeovers make more money for a lot of people but the question is whether they increase the strength of manufacturing industry. Can you make a case for that?

(*Mr Stormonth-Darling*) I have no evidence either way as to whether R&D goes up or goes down in the hands of the acquirer. I am afraid I cannot answer that question; I have no research on it.

*Lord Clitheroe*

1947. The United Kingdom and the United States are very parallel in the way in which they function but those are the two countries which at the

moment seem to be somewhat at the bottom of the list on their manufacturing abilities and I wondered whether there is a conceivable relationship in this that argues the case against that excellent case you have been expounding?

(*Mr Stormonth-Darling*) I think the United States and the United Kingdom, while sharing a financial market system which we have in common (which I do not believe is really to blame) have in the last several years experienced rather higher inflation and rather higher interest rates than those countries which are the paragons of virtue in this business of R&D—Germany and Japan. I think that is where the finger of blame ought to be pointed the most.

*Lord Bruce of Donington*

1948. Would you say that in your view the present free market system is dealing quite satisfactorily with the situation, and apart from certain changes which you have mentioned which are essentially of a minor nature, everything is really functioning very well?

(*Mr Stormonth-Darling*) I think everything is not functioning very well in terms of our economic record and our R&D expenditure in particular. But I do stand to my view that it is not the fault of the financial markets. I think the faults lie elsewhere.

*Lord Kearton*

1949. We visited Japan two years ago and were very impressed by their long-term attitude. The Japanese have started to invest in this country and one company they bought recently, of which I had some personal knowledge, is Samuel Courtauld, a textile company, which they bought for £25 million. At the time the textile industry was going through a bad time and comment was that the parent company Courtaulds were to disinvest. The Japanese have just announced that they are to invest £60m in Samuel Courtauld because they are so confident about the long-term prospects and the stuff these factories make. What is the difference is that they have seen opportunities for large-scale investment which management here did not see. Why is that?

(*Mr Stormonth-Darling*) I sincerely hope they are right in making that judgment.

Lord Kearton] Their previous record is that they have been extremely right.

Lord Vinson] Their cost of money is half what it is here.

*Lord Kearton*

1950. No, they borrow here. That is the interesting thing.

(*Mr Stormonth-Darling*) I think possibly they have been more successful managers.

We came to that conclusion that the Japanese were better managers. We find case after case. They took an existing British company—Dunlop is a case

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in point—and transformed it within three years. When you say “better managers”, it comes down to the ethos of management and the manager never having to look over his shoulder. That is one thing. They were concerned with the product, with quality, with customer service, with human relations and so forth. I do not remember them ever saying, “One of the things we are concerned with is to make a satisfactory return on our money.” In actual fact they made satisfactory returns but they did not start off to do that. They started off to make a superb product and find out what the customer wanted and gave good customer service. That is the culture difference.

(*Mr Stormonth-Darling*) Yes.

*Chairman*

1952. In your view, do manufacturing companies do enough to explain their policies and their plans to the financial institutions of the world?

(*Lord Roll of Ipsden*) As far as the financial institutions are concerned, I think one can never say enough but they appear to be doing enough. We certainly have a great deal of experience of investment programmes and financial analysts of United Kingdom companies—we have sponsored foreign companies as well as British companies—and as far as we know, certainly the financial managers are pretty good.

(*Mr Stormonth-Darling*) I think that is right and it has changed enormously for the better over the last five years and I think all the good, well-managed companies say that talking to fund managers is itself a desirable long-term investment. The fund managers are actually customers for their shares, like somebody else is a customer for their product, and there is a terrific amount of dialogue going on. In short, I think they do that now. Obviously there are still some exceptions which can be made better and the fund managers can do a better job actually in having a better understanding, getting to know things better than they actually do.

1953. Could you give us a brief comment on your policy of investment for small- and medium-sized enterprises and the importance you attach to that?

(*Mr Stormonth-Darling*) Actually the fastest growing sector of the investment market here in this country is what is now called development capital. In our own institution certainly, we have a department of about 20 people doing that and a large amount of our pension fund clients' money

committed to it, and that, of course, is strictly long-term investment, because you do not know when you are going to get your opportunity to sell, so it is the real long-term and that is the fastest growing segment of the investment market. We here in the United Kingdom are way ahead of Germany in this area and way ahead of the whole of Europe put together, both in the amount of money that is committed to development or unquoted securities investment and in the amount going in year by year. In 1988—I do not have the 1989 figures—the United Kingdom was investing £1.3 billion in this area, with the whole of the rest of Europe only investing £1.1 billion, so it is clearly a major item for the United Kingdom institutions.

1954. And funds such as you manage do put in capital of that kind into unquoted small companies?

(*Mr Stormonth-Darling*) Absolutely. We actually go to our pension fund clients saying, “We think it is a good idea if you commit a certain proportion of your pension fund for this,” and we have a staff that handles investments for them. There are two problems with this at the moment. One is high interest rates destroying a lot of businesses and the second is that there is more money waiting around than we can find suitable investment opportunities for.

Lord Taylor of Gryfe] It would be very interesting to have a brief paper on these factors. I think this is quite important because we have had many industrial representatives who simply blame the City for lack of long-term thinking and taking a short-term view and so on, and the fact that there is this venture capital floating around the country stimulating industry is, I think, quite important. If Mr Stormonth-Darling could give us one page on what he has said, which might include the other institutions who are doing it apart from Mercury Asset Management, it would be helpful.

*Chairman*

1955. Could you let us have a note on that?<sup>1</sup>

(*Mr Stormonth-Darling*) I have a small time problem. I am going overseas almost immediately. Could it perhaps wait for ten days or so?

*Chairman*] Yes, of course. May I say we are extremely grateful to you. We have given you rather a grilling but I hope it did not appear offensive at any time. We are sorry we have overstayed our time.

<sup>1</sup>See page 314.



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**Memorandum by Mr Peter Stormonth-Darling  
Mercury Asset Management Group Plc  
VENTURE CAPITAL**

This note provides an overview of  
the Venture Capital industry in the UK and the Rest of Europe.

In 1989, 124 venture capital organisations in the UK raised £2.2 billion from investors, an increase of 68 per cent over 1988, and invested £1.7 billion in over 1500 companies. Venture capital for SME's represented 34.1 per cent of the total invested, with the balance mostly in management buy-outs.

In 1988, the United Kingdom, with 16 per cent of the world venture capital market, ranked second after the United States. This is in contrast to the rest of Europe whose aggregate share amounted to only 13 per cent. While venture capital mainly developed in the late 1970's in the UK, the rest of Europe has only shown significant growth since the mid-1980's. The relative maturity of the UK market can be gauged by comparing venture capital portfolios as a percentage of GDP; the UK has the highest ratio with 0.7 per cent compared to 0.6 per cent in the US and 0.2 per cent in France, the only other sizeable market in the EEC.

While the United Kingdom is the dominant European market for venture capital, the rest of Europe is beginning to close the gap. In the period 1986-1989, the Continental European venture capital annual investment rate grew at 37 per cent per annum compared to the United Kingdom's 28 per cent.

As a consequence of these trends, venture fund managers are making an increased commitment to Europe. London-based institutions such as 3i Plc, the largest by far, and others such as the venture capital arms of Mercury Asset Management Group Plc, Midland Montagu, N M Rothschild & Sons Ltd and Schroders Plc, are setting up subsidiaries or joint-partnerships to provide investors with access to investment opportunities on the Continent.

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VENTURE CAPITAL STATISTICS

		1986	1987	1988	1989	Compound Annual Growth Rate
<i>United Kingdom</i>		<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>
Total Amount currently invested <sup>1</sup>	£ billion	2.0	3.0	3.6	4.7	33
New Investment in Year	£ billion	0.8	1.2	1.4	1.7	28
UK Share of Europe's New Investment in Year	per cent	62	60	55	56	
<i>Rest of Europe</i>						
Total Amount currently invested <sup>1</sup>	£ billion	1.2	2.4	3.1	4.0	49.4
New Investment in Year	£ billion	0.5	0.8	1.1	1.3	37

<sup>1</sup> Reflects new investment less realisations.

Sources:

European Venture Capital Association.

British Venture Capital Association.

29 October, 1990

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[Continued

**Memorandum by the Electronic Components Industry Federation****INTRODUCTION**

The Electronic Components Industry Federation (ECIF) is the trade association representing manufacturers in the UK of all types of electronic components, ranging from integrated circuits ("chips") to relays, switches and connectors. Components are the key building blocks from which all types of electronic equipment and systems are assembled, and since it is frequently the performance of the advance components which determine the performance of new equipment and systems, it is apparent that the electronic components industry has a key role in the innovation process.

ECIF would regard "innovation" as including the design of new products and the introduction of new manufacturing processes; it is assumed that this is covered by the Sub-committee's definition of innovation ("the economically significant application of new knowledge or techniques"), and that "new" in this context means new to the company concerned, and does not refer solely to newly discovered knowledge and techniques.

Finally it is worth mentioning that a leading components manufacturing company in the UK has recently conducted some research about public perceptions of innovation and innovatory companies; this has produced disturbing evidence that much of the public associates innovation primarily with the world of fashion and "gimmickry". It is to be hoped therefore that the Sub-committee's enquiry will help to correct this and draw attention to the fundamental importance of innovation to the economic success of manufacturing industry.

**Q1 WHAT ARE THE EFFECTS OF COMPANY ATTITUDES AND STRUCTURES (INCLUDING PERSONNEL POLICIES, INVESTMENT DECISIONS)?**

Company attitudes and policies are obviously of critical importance. One important inhibiting factor is the generally low standing of qualified scientists and engineers within British industry, reflected in their generally inadequate level of remuneration; this of course is to a considerable extent a reflection of general attitudes in British society towards scientists and engineers. With regard to investment decisions, these are certainly constrained especially amongst small and medium-sized firms by current economic circumstances, and in particular the high cost of money.

A helpful development, of recent years on the other hand is the substantially changed attitude of trades unions towards innovation, which is no longer resisted in most areas but readily accepted and even welcomed.

**Q2 HOW ACTIVE ARE UK COMPANIES IN SEEKING OUT EXTERNAL TECHNOLOGY, ESPECIALLY FROM OVERSEAS? HOW WELL DO THEY ADAPT AND APPLY IT?**

Underlying this question appears to be an unspoken assumption that "external technology, especially from overseas" is in some way particularly desirable; such a generalisation in ECIF's view goes too far. No one would suggest that the UK can be completely self-sufficient and up-to-date in every field of technology, and the extent of dependence on foreign technology varies from industry to industry. In ECIF's view it is the effective application of new technology which is the crucial factor, rather than its source.

In the electronic components industry in the UK, there is a strong presence of multi-national companies with headquarters and operations in one or more other countries; such companies provide a ready channel for cross-fertilization of technology between the different countries in which they operate, and the pace of innovation in their UK operations is likely to be determined as much by their parent company's policies on innovation as by local factors.

In this connection, the position of new inward investors in the UK is important. Such companies normally start by establishing a market position with imports, then proceed to assemble imported kits of parts, and eventually move to full local production with a substantial local content of materials and components. But unless they take the further step of establishing local research development and design facilities, then such operations are unlikely to be the early beneficiaries of innovations originating elsewhere in the multi-national group.



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**Q3 WHAT ARE THE RESPECTIVE ROLES PLAYED BY PRODUCT DEVELOPMENT AND PRODUCTION ENGINEERING IN TECHNOLOGICAL INNOVATION?**

Successful innovation requires that the production process should be taken into account from the beginning of a project. In other words product development and production engineering do not have separate roles, but are essentially integral parts of the same process. It is a weakness in the UK that the training of development engineers pays scant attention to production engineering.

The integrated nature of the two activities is very well illustrated in the integrated circuit (ic) industry, where each new generation of product not only requires, but frequently is initiated by, advances in production technology. Unlike industries where an existing production line can produce new models by a change of dies or by computer control, a new integrated circuit generally involves a totally new production line. And because the pace of technological advance in this industry is so rapid, lines costing £100 million or more frequently become obsolete before normal "pay-back" can be achieved. The price of remaining in the forefront of this highly innovatory industry is therefore very high.

**Q4 HOW EFFECTIVE ARE THE ACTIVITIES OF GOVERNMENT DEPARTMENTS IN PROMOTING AND SUPPORTING INNOVATION?**

In the past, a number of Government schemes for the promotion and support of innovation have been useful and effective; notable examples are DT's Micro-processor Application Project (MAP) and Micro-electronics Industry Support Programme (MISP). MAP was aimed at encouraging innovation in all sectors of industry and commerce by the application of innovatory micro-electronics techniques, and was subsequently emulated by a number of other countries. MISP was designed to encourage investment in modernisation of the micro-electronics industry itself by offsetting the high cost of such investment referred to in answer to the previous question and the difficulty of achieving a satisfactory return on investment judged by normal criteria. The funds made available for MISP by the Government were very limited however (a fraction of those being deployed to the same end by France and Germany at the same time), with the result that individual grants were too small a fraction of the total costs involved to have a substantial influence on investment decisions.

Such support schemes now have virtually ceased to exist and those that remain are less effective since they are constrained by arbitrary conditions such as the requirements to involve educational institutions and that all projects must be collaborative, together with the strong emphasis placed on small and medium-sized firms.

Current concentration on support only for pre-competitive research ignores the fact that a crucial stage in the innovation process is the translation of research and development into "economically significant applications"; this is vastly more expensive than R&D, and consequently the area where it would be most logical to apply Government support. The argument that market forces alone should determine decisions in this area ignores the fact that the world market in key technologies such as micro-electronics is far from free, and is seriously distorted both by structural factors and in many cases by the deliberate policies of other governments who recognise the importance of these key technologies and are determined to ensure that they have a strong competitive capability in them.

The climate for innovation in the industry might be greatly helped if Ministers in their public declarations gave as much support, encouragement and praise to innovatory British companies as they do to inward investors.

Finally ECIF would like to draw attention to a specific situation with regard to the Ministry of Defence. For many years through a branch known as CVD, the Ministry provided financial and technical support for a certain amount of development of new electronic components in anticipation of specific requirements related to particular defence equipment projects. Advanced components which would not have been developed without such assistance have subsequently found their way into many current defence equipments. Unless such semi-speculative advance development of new components is undertaken, then the innovatory process is liable to be considerably prolonged, or alternatively the designer of a new piece of equipment is forced to rely upon those components available off the shelf, which necessarily will not represent the latest "state of the art".

In the absence of any support from MoD, the whole risk of such development would have to be borne by either the component manufacturer or the equipment company. It is understandable that neither should be very ready to do so, particularly in the current era of highly competitive procurement, when foreign suppliers are actively encouraged to seek MoD business, and there is no assurance that even if a British company undertakes successful development of a project, it will receive the long-term production orders which alone could justify investment in development.

Consequently there is a real risk of erosion of the UK's defence technological infrastructure in electronic components.

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## Q5 WHAT ARE THE EFFECTS OF CITY ATTITUDES TO INVESTMENT IN INNOVATION?

Innovation, particularly in advanced industries such as micro-electronics, requires above all what has been called "patient capital". The City of London is not famous for providing such funds, and whilst there are organisations which specialise in providing venture capital, these are in the fringes of the market. In general innovation is equated with a high level of risk, rather than being seen as essential to the profitable survival of a company.

Why this should be so is not easy to see; one possibility however is that the City has in the past not provided itself with adequate sources of technically knowledgeable advice, which has led to ill-advised investments in apparently innovatory companies in the past, and that such disappointing experiences have brought into disrepute the whole idea of investing in innovation.

## Q7 HOW EFFECTIVE ARE THE MECHANISMS FOR TECHNOLOGY TRANSFER FROM HEIs, RESEARCH COUNCILS AND PUBLIC LABORATORIES TO MANUFACTURING INDUSTRY?

HEIs are regarded by industry primarily as a possible source of technical ideas with the additional capability to carry out a limited feasibility study of the initial proposal. Industry's role is to take the idea, complete the feasibility study and carry out the development necessary to provide a usable product.

Research Councils are regarded by industry as the catalysts for co-operation between HEIs and industry. The electronic components industry comes within the remit of SERC (Science & Engineering Research Council). In general SERC is seen in the Electronic Components sector as effective in providing platforms for co-operation between industry and HEIs. A number of schemes are seen as useful.

- Co-operative awards in Science and Engineering (CASE Studentships). The student spends three months with the partner. Industry obtains a useful access to student tutor and university expertise. The scheme provides training for the student and a useful transfer of know-how to industry.

There has been a problem with department heads in some of the older universities who give priority to filling Quota Studentships, leaving little resource of CASE Studentships. This is beginning to change as the benefits of a liaison with industry become appreciated.

- Co-operative grant (SERC). Formal agreement to the research proposal with agreement that the intellectual property rights transfer to industry on completion. This requires substantial contribution from the industry partner in funds and resources. It provides a useful entry to fundamental research over a significant timescale.

A major problem may develop over the ownership of the intellectual property rights of any successful outcome. The pressure for HEIs to become increasingly financially independent is understandably making them more aware of the potential financial gains of a scientific breakthrough and brings a desire to benefit in any financial gain. Formulae to contend with this situation need to be developed.

- Teaching company scheme which extends the co-operative grant scheme to focus on a particular industrial problem with an expectation that university workers will join the industrial sponsor are particularly well regarded by industry. It accelerates the research because industrial pressure naturally results in time constraints and encourages, almost forces an intense interchange of information between partners. The expertise is transferred to industry as the university scientist joins the industrial sponsor at the end of the project.
- Fellowship schemes designed by SERC and the Royal Society to facilitate co-operation have perhaps disappointingly been under-utilised. Designed to use the more mature university scientist, perhaps there has been an understandable reluctance to change in mid-career. This scheme could usefully be better exploited by both parties because it has brought considerable benefit when used.
- Link schemes fostered by the DTI to facilitate consortia consisting of HEIs possibly Government establishments and industrial companies to tackle a research programme have had a slow introduction because of the unreasonable length of time taken by the DTI to accept proposals. Proposals agreed between consortia partners take 18 months-2 years to be accepted by the DTI by which time the members of the team have dispersed to other commitments.

In general the value of a working liaison between the electronic components industry and HEIs is appreciated and it is felt SERC is enterprising on the schemes provided.

## Q8 DOES THE UK BENEFIT SUFFICIENTLY FROM EC SUPPORT FOR INNOVATION? HOW MIGHT IT BE IMPROVED?

ECIF is unaware of any substantial benefits to the UK electronic components industry from EC support for innovation to date.

There is however an urgent need for EC support for a European integrated circuit industry, and the UK should benefit from such support.

It is generally accepted that integrated circuits are a key enabling technology for any advanced industrial economy, and a key factor in innovation. EECA (the European Electronic Component Manufacturers



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[Continued

Association, of which ECIF is the UK member) has been engaged in continuing discussions with the European Commission over the last three or four years about the need for action by the EC to ensure that this capability is available in Europe, and had received a generally sympathetic hearing. It is therefore doubly disappointing that a report recently prepared by a group of experts which is due to be discussed by the Council of Ministers at the end of May, after setting out at length the importance of the industry, the problems from which it suffers, and the need to ensure that the technological capabilities of the industry are effectively translated into timely investment, then reaches the surprising conclusion that "there should be no special sectoral regime for investment in semiconductors". If this line is adopted by the Council of Ministers, the Community (including the UK) will have considerable difficulty in ensuring the availability to its industry of this key innovation-enabling technology.

**Q9 WHAT ARE THE EFFECTS OF THE VARYING RELATIONSHIPS BETWEEN COMPANIES AND THEIR SUPPLIERS?**

Close relations between customers and suppliers are of crucial importance in the electronics industry. Electronic equipment manufacturers and the suppliers of component are interdependent—neither can thrive unless the other also is successful. Traditional adversarial attitudes between customers and suppliers are outdated and shopping around for the cheapest possible source of supply and placing orders for small quantities at frequent intervals are not conducive to investment in innovation by the suppliers. Long-term relationships of mutual confidence (such as are commonplace in competitor countries, notably Japan, but regrettably much less so in the UK) are essential in the age of "just-in-time" and "total quality". Equipment companies need to be prepared to establish close relations with a small number of suppliers and discuss with them at an early stage their ideas about innovative future products, so that the component supplier can undertake the necessary development of advanced devices early enough to ensure their availability when the equipment manufacturer needs them.

The establishment of these close long-term relationships also implies the need for local sources of components, rather than reliance on distant sources in other countries. Apart from the physical problems of time and distance, it is inevitable that a components manufacturer developing an innovative new device will give his local customers first access to it and those in remote countries will be last in the queue. And this effect is bound to be accentuated when, as happens notably in the case of Japanese component suppliers, the same companies also manufacture equipment and therefore are in direct competition with British equipment manufacturers.

**Q10 WHAT FACTORS INFLUENCE DECISIONS TO INVEST IN INNOVATION IN THE UK OR OVERSEAS?**

The need for a presence in or near important markets is obviously a major factor in all investment decisions, and is therefore likely to influence UK firms to invest in areas overseas such as the Pacific Basin. Continental Europe in this context should be regarded as part of the home market, rather than "overseas".

**Q11 IN THE LIGHT OF ACOST'S REPORT DEFENCE R&D: A NATIONAL RESOURCE, AND THE GOVERNMENT'S RESPONSE, IS THERE A SATISFACTORY RELATIONSHIP BETWEEN THE DEFENCE AND CIVIL SECTORS?**

In the particular case of the electronic components industry, there is not a hard and fast line between civil and military applications. There are of course some devices which are solely of military application, but many others are equally relevant to defence and non-defence markets.

**Examination of Witnesses**

MR DAVID KYNASTON, Managing Director, MR DUNCAN EDWARDS, Strategic Planning, Philips Components Ltd, and MR RICHARD BULLOCK, Director General of the Electronic Components Industry Federation, called in and examined.

*Chairman*

1956. Mr Kynaston, thank you very much for coming along with your colleagues. Can you briefly say what sort of components you cover?

(Mr Kynaston) Electronic components of a very wide category, from integrated circuits, such as silicon chips (for computers) and cathode ray tubes (for television), to boring passive components, resistors and capacitors.

1957. Could we start with this broad question? How important is innovation in the progress of your company? Do you regard it as absolutely vital to spend as much as you possibly can?

(Mr Kynaston) Yes, it is vital. It is important, I think, to place the electronic components industry in context. We are obviously the bedrock underneath electronic equipment. Now, very rarely do you see our products as such. You see the cellular telephone, a crystal display perhaps, a keyboard; behind there are electronic components which people like

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MR D KYNASTON, MR D EDWARDS  
and MR R BULLOCK*Continued*[Chairman *Contd*]

ourselves design and deliver. The important thing is the functionality—a terrible word—of those electronic components. Equipments depend on the excellence of the components. The designer of the equipment is always limited in what he can do by the quality and performance of the components he selects. Having said that, that puts it into a very, very long timeframe. We are often developing components for markets which may not come about till four years hence. We are very often involved with shrinking the size of components. You would not be very pleased with us if we delivered your cellular telephone in a suitcase. The only reason you can make a cellular telephone that is portable today is due to the improvements in the electronic components. There are something like three fundamental tiny chips that go into a cellular telephone; the rest of it is just packing and “also-ran” components, all the functionality has been shrunk into some very small pieces of silicon. That is our job, to anticipate that, innovate that shrinkage in the process of development of our product.

1958. What is the balance of work you do in product innovation between speculative development, which you think is going to have a market in two, three or four years' time, and close relationships with your customers who tell you they are going to need this sort of new component in X years' time?

(*Mr Kynaston*) We do very little out-and-out speculative development. We do speculative research and materials development, as you would expect, but for us it is an issue of choice. We have limited capacity and we really need to choose where we put that capacity into the market. The failures for us are not speculating on the wrong area of applications, they are failures against competition perhaps or something like that, but very rarely selecting the wrong area. There is more out there than we can service.

1959. So you are in close touch with your customers?

(*Mr Kynaston*) Very close.

1960. You develop new components to meet the perceived requirements of those customers to put into finished products in X years' time?

(*Mr Kynaston*) Components fall into two categories. Resistors and capacitors are things it is very important to have but they do not define the functional performance of the product, they are commodities. The tougher area is application-specific components. Application-specific components are for the most part only ever developed with our customers. You need to know before you invest a large amount of money into developing such an integrated circuit that can cost hundreds of thousands of pounds in development that there is someone out there who will buy it.

1961. So you develop it to the specification which your customer has given you and, provided you meet that specification—

(*Mr Kynaston*) No, we develop it against a broad set of requirements. The customer says “I want to be moving up in frequency in the cellular radio market. How do I do that?” We go back with a set of proposals, do some prototyping in silicon, introduce him to new concepts in prospective development.

1962. You have in a sense a guaranteed market?

(*Mr Kynaston*) No, no guarantees.

1963. By relationships with your customers?

(*Mr Kynaston*) No guarantees. He is talking to someone else the whole time.

*Lord Vinson*

1964. You are very much a state of the art industry in terms of keeping technologically advanced. Are there constraints that prevent you from doing the things in terms of technological development which you would like to do? Are there financial constraints or training and manpower constraints or do you feel quite unbound in terms of technical development?

(*Mr Kynaston*) I think there are some very real constraints. They are rather peculiar. In my own company 45 percent of the product I sell<sup>1</sup> goes to Japanese-owned companies in the United Kingdom, 60 percent of the product I deliver (including that 45 percent) goes to foreign companies. So I am only serving indigenous UK companies with 40 percent of the products. The tragedy is that the electronic equipment makers in Japan are pulling me much harder in developing new techniques, in developing new components, than indigenous UK companies are. That is actually a limitation on me because the Japanese component competitor is closer-coupled to the equipment maker in Japan than I am. We have a great limitation on us. We have far too much of our investment in Europe for our own well-being.

*Chairman*

1965. What reason is there in your view for the bigger pull from foreign companies?

(*Mr Kynaston*) I think your previous witnesses here touched upon a lot of it. The Japanese equipment maker sees things on a far longer time-horizon and a lot of it is due to the “patient capital”; a lot of it is due however to better management of strategic development risks.

1966. Is the amount of development work you do on new improved products limited by the money you can spend on it or by the demand on you?

(*Mr Kynaston*) It is limited by money that we can spend on it. We as a company dominate the

<sup>1</sup> *Note by witness:* This refers to sales to customers outside the Philips Group (see answers to questions 1969 & 1970).



*17 October 1990]*MR D KYNASTON, MR D EDWARDS  
and MR R BULLOCK*[Continued]**[Chairman Contd]*

consumer electronics supply chains in Europe. We do not do so in the general industrial area. With money we could become far more successful. We have chosen with our limited capacity for self-renewal with cash and so on and so forth to concentrate on given areas. We could move into larger areas.

1967. But then if you have this potential good market, why does not your parent company provide you with more development funds to capture that market?

(*Mr Kynaston*) If I talk about developing integrated circuits—let us talk about integrated circuits in general—as a minimum they consume 15 per cent. in R&D a year. Some companies are investing 20 to 25 per cent.

1968. Of turnover?

(*Mr Kynaston*) Yes.

*Lord Kearton*

1969. What is your turnover in the United Kingdom, generally?

(*Mr Kynaston*) Our total deliveries from the UK are £400m a year.

1970. Of everybody else's components?

(*Mr Kynaston*) Yes. Excluding exports that is "third party" sales in the United Kingdom, of about £250 million. So we can say £100 million is going to the Japanese, as I said earlier. We are talking about £2.66 billion<sup>1</sup> remaining activities around the world. It is the world's largest component manufacturer in respect of cathode ray tubes and passive components and the second largest overall.

*Chairman*

1971. You obviously have a captive market and a successful business. Why does not your parent company make available more funds to capture this market that is available in the United Kingdom?

(*Mr Kynaston*) Because the return on funds we are consuming is not adequate for the financial markets we are in.

1972. Is it fair to ask what that return is, or is it private?

(*Mr Kynaston*) That is private, but we are like any other company that is principally European-based. Although we span the world our mentality is European. Far too much of our investment for our well-being is European. We are strapped with the same supply of cash like everybody else.

1973. Would you like to have more in the United States and overseas?

(*Mr Kynaston*) It would be nice.

*Lord Kearton*

1974. We saw Telettra in Italy and were very impressed with their general performance and they seem to be very successful in the same line of business as you?

(*Mr Kynaston*) Very much so.

1975. They talked about you very warmly.

(*Mr Kynaston*) I hope we are seen as pretty important and I hope we are seen as dynamic. Nevertheless at the end of the day we still have to serve our shareholders and that is jolly difficult to do and it does limit investments. We have recently had to take some very hard measures. We have decided to forgo the development and production of memory devices. That may not mean much to yourselves but this is 30 per cent. of the electronic components market.

*Chairman*

1976. These are RAMs?

(*Mr Kynaston*) Yes.

*Lord Kearton*

1977. We found that people were very upset with Philips withdrawing from memory devices.

(*Mr Kynaston*) It is because we have had to cut our cloth.

*Chairman*

1978. Because the company as a whole was not earning enough on its total turnover?

(*Mr Kynaston*) Correct, but the markets we operate in for components are manufacturers as well.

1979. Because of competition?

(*Mr Kynaston*) Yes. I run a business where the selling expenses are 8 per cent. of turnover, a business where I am happy if I can make 5 per cent. on the R&D. I run a very capital-intensive business. Lord Kearton whom I once worked for knows about those problems.

*Lord Kearton*

1980. We were very interested when Telettra, which is owned by Fiat, disclosed to us that the following week they were joining up with the French Alcatel. That seemed to me to be quite a good thing to do.

(*Mr Kynaston*) Yes, it is. I may have to make similar moves.

<sup>1</sup>Note by the witness: This figure refers to the whole of the Philips Group.

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MR D KYNASTON, MR D EDWARDS  
and MR R BULLOCK*Continued**Lord Taylor of Gryfe*

1981. Your figures are impressive on your export performance and the markets you are taking particularly, but if we take the industry in general this country is in deficit?

(*Mr Kynaston*) Yes, correct.

1982. Why? Here you have an example of a sector of the market in which we are performing excellently, in which you are exporting. You have your remaining Japanese market in Japan and their subsidiaries here but overall we are in deficit in this industry. Why is it we are in deficit here as a sector of the same industry which is performing extremely well?

(*Mr Kynaston*) If I can answer that, first of all, I should explain that a large proportion of my exports go internally within our own company. They go into other factories of Philips in Europe to be assembled into television sets, VCRs, microwave ovens, cellular telephones and various other things. So you have to understand that, first, I am the supply line within this country. I will probably be shot for this but I believe there is no indigenous United Kingdom electronics company that any longer will reach global proportions. Therefore, who is going to set up vast semi-conductor plants here? Only the inward investors alongside their equipment plants. That is exactly what you are saying.

1983. What type of companies did you say would not reach global proportions?

(*Mr Kynaston*) I do not believe there is a single large United Kingdom electronics company that can reach global proportions?

1984. Not GEC-Marconi?

(*Mr Kynaston*) No. I should not talk about other companies but what do you do with cash management? Look at it or use it? If you get there by sitting in the middle of an art gallery looking at the cash managers, that is okay, but it is not for me.

(*Mr Edwards*) Just to get this into focus, if you take the top 20 equipment companies in the world, they buy 53 per cent. of the component output, so they have tremendous leverage and to get the necessary critical mass is going to be a tremendous problem for all United Kingdom companies.

(*Mr Kynaston*) There is not a British company in the world's top 50 electronics companies.

1985. If you could get closer to your customers would that help you to expand your output in a profitable way?

(*Mr Kynaston*) Indeed so.

1986. What is the obstacle to doing that?

(*Mr Kynaston*) It costs money. For instance, I keep people full-time in Japan. We have a large number of people visiting Japan at any one time, engineers on what we call design-in exercises, sitting

alongside Japanese designers. I count the Japanese as an extreme case. Today a large corporation, as Mr Edwards has said, can make demands, for example, IBM or Sony or Matsushita or anybody else actually says to you, "I want a certain percentage of your capacity dedicated to me," and they actually mean that in design as well as manufacturing.

1987. People say that to you?

(*Mr Kynaston*) Yes, and unless you do what they want, you lose their business.

1988. And you meet that requirement?

(*Mr Kynaston*) Yes, but we have to choose because we cannot meet it everywhere.

1989. You said that you were in a highly competitive market. Are you limited not only in funds for product development but are you also limited in funds for capital investment in automatic assembly, for instance, and that kind of thing? We saw a lot of this in Italy.

(*Mr Kynaston*) Automatic assembly is not part of my business. As Philips Components we are providing components which are assembled.

1990. All right, increased automation in the manufacture of your components?

(*Mr Kynaston*) The answer is yes. We spend more on process development than we do on our own R&D and that is characteristic of our business. Our business is probably like the chemical industry.

1991. If you could spend more would you be more competitive?

(*Mr Kynaston*) No, I do not believe that is our problem. All companies have some problems with competitiveness. I think there is an attitude problem in Europe when it comes to competitiveness. If you look at the dedication in Far Eastern companies and a few American companies, it often exceeds the dedication in European companies.

1992. In Italy we also visited a company called S G S Thomson.

(*Mr Kynaston*) Mr Pasquale Pistorio's company.

1993. They are making investments in producing RAMs of various kinds. This seemed to us to be a very large investment with relatively high risk because it is a long-term operation. Have you ever thought of making that sort of investment?

(*Mr Kynaston*) We make investments on the same scale, but we have chosen to go out of RAMs. If you take that particular company it is very concerned with the finance and obviously Mr Pistorio is looking for involvement with Siemens, which he is welcome to do. It is a very competitive area. There are some 17 companies operating in the RAM area. The selling price we have been able to obtain for



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[Continued

[Lord Taylor of Gryfe *Contd*]

RAMs has halved in the space of 12 months and that is the dynamics of the business we are in. We do not sit and propose what prices might be three years hence, with that sort of product, if you are not in the market in the first year and a half of the product's introduction, you make losses, period. The golden profit period is the first year and a half.

1994. But you can expect us to ask the question, why do they see it as a profitable investment and you do not? You, a British-based company, do not and they, a continental-based company, do?

(Mr Kynaston) My answer is that Philips Components have a European life, not just a British life. We have chosen to invest in other areas which are more profitable.

I wish S G S Thomson well but I think they are going to have a lot of problems with that property.

*Lord Taylor of Gryfe*

1995. You are an important industry to Britain. Do you look for any assistance in any way from government sources, say, in taxation treatment on R & D? How do you recruit? Does the educational system provide you with an adequate number of scientists? Do you farm out any research to universities? How do you see your relationship to the state in relation to fiscal policies, in relation to educational back-up?

(Mr Kynaston) If I could start with the relationship to higher education institutions, we in fact run a higher education scheme where we fund a modest amount of project work in the universities and polytechnics. That is something Mr Edwards developed and he keeps us very closely in touch with them. What we do is provide real examples of failure and success for university courses which are exercised through projects. A classic example of great success for the United Kingdom was the development of Teletext. Teletext is a UK world-beating invention. It was the foresight of the DTI at the time to back it, it was the foresight of my own corporation to go with it when there was no proven market. It turned out to be a huge success. We use Teletext now as a project example—we have others. We have modest involvement in things like the LINK pre-competitive research scheme. We run a number of ESPRIT and RACE programmes which take us outside the bounds of the UK obviously. When it comes to recruitment, I do not think we have great difficulties recruiting scientists. We do have difficulty in recruiting properly qualified engineers, engineers who can really contribute in business in a rounded sense. Their worst deficiency is the lack of manufacturing engineering knowledge. We have to teach them everything. We have a lot of engineers who have come in to our business who have no concept of design to a cost, no concept of manufacturability. We have to put that into them.

*Chairman*

1996. Would you like to see that taught to engineers in their university courses or post-graduate?

(Mr Kynaston) During the courses it is essential.

1997. During an undergraduate course?

(Mr Kynaston) Yes.

*Lord Kearton*

1998. You can as a company sponsor such a course. Most universities would be very glad if Philips came along and said, "We want people with a particular skill, we are prepared to fund a lectureship", and so on.

(Mr Kynaston) We have done that with Sussex. It has now been picked up by the Open University. That alone is not enough. The other comment I would make is that in the craft areas—and we employ only 15 percent of what you call craft and clerical—the broad educational standards are inadequate. Our educational system is embarrassing. If you compare my raw material with that of my colleagues around Europe, people do not seem to have a basic toolkit for life. All I ask is that they come out of the secondary education scheme with a toolkit that works. If you cannot add up and you cannot spell, it does not seem to work.

*Chairman*

1999. Could we pursue your point that engineers in undergraduate courses should be given broadly I think you mean more management training in understanding the importance of cost and the like? At present it is a three-year undergraduate course and many universities are going to four years. Would you take out some engineering content from those courses and put in management? I use the term broadly.

(Mr Kynaston) I would. You are overlooking the Scottish system, which is four years of course.

2000. You think there is too much attention given to engineering science and not enough to practical problems of industry?

(Mr Kynaston) Yes.

(Mr Edwards) I have immediate experience. As Mr Kynaston says, I have been running our education programme. The response from the universities varies tremendously. There are ones that are quite happy to have a multi-disciplinary approach—including management, including design, including manufacturing—this is a package we developed. Talking to many of the universities however they throw up their hands in horror and say "We can't take the management, we can't take the design, we are just doing the manufacture." I would think that is 80 percent of the ones I am talking to, and I talk to 58 universities and colleges.

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MR D KYNASTON, MR D EDWARDS  
and MR R BULLOCK*Continued**Lord Kearton*

2001. On the question of self-help, I went to Aberdeen a fortnight ago to see a training establishment for skilled artisans set up by Shell and BP. They have an intake at 16 with O levels and proceed to National Highers. They have marvelously equipped workshops, both theoretical and practical training, they have swapping between different trades so that they have good knowledge of other trades, topped up after three years of doing this by two years on a platform. In their mid-20s skilled technicians are getting £24,000 to £25,000 a year. They have 800 applicants for 80 places. The buildings are provided by the Aberdeen City authority, the course is very closely tied up with Aberdeen Technical college and there are lots of secondments from major oil companies who found that as these people did not exist they would have to set up their own training scheme. Aberdeen is an enormous success.

(*Mr Edwards*) That is why we are on the same route.

2002. Must not big companies go the same route and do this in collaboration with local authorities, local technical colleges and so forth?

(*Mr Edwards*) There is a limited amount we can do. The conclusion we came to was that using the limited funds available, the right thing to do was to set the frame so that the universities could operate. Basically what we have done has been to try and design a series of projects that involve lots of disciplines and say, "Look, gentlemen, this is what life is actually about". If I may mention one example, if you look at Southampton they are actually putting people from business college together with those from engineering college. It is the first time they have done it. That is how life works, in teams. It is these sorts of aspects we were trying to promote.

2003. Aberdeen is up to the best standards I saw in Germany in training because it was a very heavy mixture of actual hands-on and knowledge of electricians, views about plumbing and so on. They were all training at a wide range of different machines. The exams taken were the appropriate City and Guilds, and National Highers. Once they went on the platforms they were encouraged to do part-time study and become platform managers themselves.

(*Mr Kynaston*) I wonder if that is a peculiarity of the Scottish system. You find it also at Heriot-Watt and Strathclyde.

*Lord Butterworth*

2004. I think you said the concentration should be at undergraduate level. I thought a number of institutions were producing part-time courses for engineers in their first, say, two years with you.

(*Mr Edwards*) Yes, we have a lot of joint projects running like the LINK project whereby university

people come in and work alongside us. Alternatively some of our guys go to university and work alongside them on a specific project, but to have it project-based is not a general thing, it is focused on a particular problem to see if we can crack it.

2005. That is rather different, yes.

(*Mr Kynaston*) To answer the second part of the question, the rest of the relationship with the state; as a general issue. I think only recently have we seen politicians speaking well of industry. We have had a very long period where that has not been the case and, of course, if you tell someone for long enough that they are not too smart, they are not really required on board, they are really all rather boring people, they start to believe it. It is very difficult to overcome that when you recruit them. Why should anyone come into industry when they have listened to people speak on television in a smart-mouth, smart-money way about the delinquencies of industry, about how they have failed everyone but themselves? It is quite a critical issue for us. It has eroded confidence in manufacturing industry. The confidence existing in manufacturing industry when I went into manufacturing in the early 1960s was enormous, we could tackle anything, do anything. Now we do not have that confidence. The second issue with respect to the state is that we do not look for handouts, we do not look for those at all.

*Chairman*

2006. From government you mean?

(*Mr Kynaston*) No. But if there is to be national purpose, if there is to be European purpose, then I accept there will be some guidance and some money which assists in that guidance because, let us face it, in Japan there is plenty of guidance and plenty of money assisting the guidance and in other parts of the world. For example, Europe is by no means on a level when it comes to guiding industry with a state hand.

2007. From what you have said, you do not want Government hand-outs?

(*Mr Kynaston*) No, but if they are going elsewhere I do not want to be in any way weakened.

2008. But do you think that it is important for Government to say that they regard increased output from our United Kingdom manufacturing industry as very important? Is that part of your feeling?

(*Mr Kynaston*) I would like to feel there was some warmth towards United Kingdom manufacturing industry.

Chairman] From Government, I am talking about.



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MR D KYNASTON, MR D EDWARDS  
and MR R BULLOCK

[Continued

*Lord Kearton*

2009. It is fair to say that five years ago what you said was absolutely true. There were some notorious statements by very senior politicians literally saying it did not matter.

(*Mr Edwards*) It has started to swing back.

*Lord Vinson*

2010. You were saying you do not look for hand-outs. Therefore you must use your own self-generated resources. This brings me back to something you heard me raise with the previous witnesses, the question of taxation treatment. The recovery of costs and the ability to recover these before you make profits—amortisation, in other words—seems to be a highly critical element in your capital-intensive industry. You were saying, for example, that the production of a new product takes probably 18 months and for 18 months you get some decent returns on your money and then it is finished. That implies you must write off any recovery costs very quickly during the 18-month period. The Government, when it did away with free-depreciation, then introduced two periods of depreciation: one, a 25-year period on the generality of equipment and an accelerated three-year period for certain forms of electronic equipment. No doubt you can take it up with them. Would you find it would be much easier if you could write off your equipment, amortise it, bearing in mind that once it is written off you cannot claim for depreciation against tax any more but that would give you an enhanced tax flow which would be beneficial in terms of the whole liquidity and viability of your business?

(*Mr Kynaston*) Anything that improves liquidity has to benefit a capital-intensive industry. It is just a great circle. The other thing is, going back to training, this is an area where encouragement could be given to industry.

*Chairman*

2011. When you say “encouragement” you mean financial support?

(*Mr Kynaston*) Yes. If you train above a certain threshold you should be encouraged; you should be rewarded.

*Lord Vinson*

2012. There are two aspects in the way you could be rewarded. One is by a training grant based on some fictitious “guesstimate” of your training levels, because it is all rather difficult. The other is to let you use your own resources on training and you can write off 100 per cent. in terms of cost in terms of your industry. Is the Federation saying to Government, “You may not want to give us hand-outs but at least let us recover our costs we have embarked on in terms of covering against tax?” Is that the sort of evidence you are putting in to Government in terms of Government rewards?

(*Mr Bullock*) We have not yet. It is something which is on the agenda in the Federation at the moment and we are actually considering how best to put it forward.

*Chairman*

2013. Does that suggest if you spend £100,000 on training you would be allowed to write off £150,000 against taxation?

(*Mr Bullock*) That is one possible way of doing it. There are many ways.

2014. But you are thinking of tax relief systems rather than grant systems, are you?

(*Mr Bullock*) I do not think we have got as far as that. I think either would bring advantages. It is a question of which one the Government might most readily swallow.

2015. It is often said there is a shortage of professional engineers, chartered engineers, because too many professional and chartered engineers are used where incorporated engineers would be quite satisfactory and could do a good job. There are two advantages: it releases professional engineers to do more high-level jobs and also gives them more job satisfaction so they are less likely to leave. Do you make sure you use an adequate number of incorporated engineers?

(*Mr Kynaston*) We try to. We monitor this very closely. We suffer a quite high level of engineers lost between the ages of 25 and 32. We lose 25 per cent. of our engineering capacity. That is an investment that is hard to put a number on but I suspect we have to live with that. This is the guy going off to get more experience elsewhere or whatever. That is the first thing. In terms of the reasons for that loss, which we analyse—everybody is interviewed as he goes out—most have said, whether it is true or not, “I was not stretched enough.” That is a terrible criticism of ourselves and we will look at it and we see what we can do about it, and we try and stretch them more. I think some of it is inevitable. I said exactly the same. I was once a physicist long ago and you always say you are not stretched enough but there is some truth in it.

*Lord Kearton*

2016. Stretching nearly always involves one-to-one supervision. You cannot stretch a chap by flinging him off the deep end. You stretch him by putting him with someone, keeping a fatherly eye on him, helping him to solve his difficulties and so on. It is a very active process.

(*Mr Kynaston*) Yes, I agree. It is almost unaffordable.

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MR D KYNASTON, MR D EDWARDS  
and MR R BULLOCK*Continued**Chairman*

2017. Would you also agree you must give the opportunity for the chap to make mistakes?

(*Mr Kynaston*) Yes. How else does he learn? But again you need a mentor when you are a young man coming into the industry. I was fortunate. I had a mentor. You need to be allowed to make mistakes. Those two wishes are increasingly unaffordable.

2018. Do you sponsor a number of undergraduates on engineering courses?

(*Mr Kynaston*) Yes, we do.

2019. And then they come to you to do a further year on location work and you pay a great deal of attention with mentors to look after them during that period?

(*Mr Kynaston*) Obviously they are sponsored by specific companies, but yes, they are stroked very heavily.

(*Mr Edwards*) Quite often it is a Director who looks after them. I tend to look after them.

2020. Would you agree that some parts of industry have not done nearly enough and it puts a lot of people off ever going into or staying in engineering? You do it well but what is your view of industry as a whole?

(*Mr Edwards*) No, I think we still have problems. We lose quite substantial numbers. This is coming back to the training issue, where we are training them and they spin off into small companies that do not train. If you like, we are putting in the market investment for that.

(*Mr Kynaston*) I think also they are under pressures that one did not experience 20 years ago. They are at an age when they are just getting married, having to finance a house against these impossible interest rates, and, therefore, they tend to move on as a way of getting more money. They are not in a terribly stable environment for being tuned in.

2021. You have said on a number of occasions the things we have talked about are highly desirable and unaffordable?

(*Mr Kynaston*) Yes.

2022. Is there, therefore, the problem that you are in an almost too competitive market because you are not able to get enough to invest for the future, whether it is in training, product development or new plant?

(*Mr Kynaston*) It would not be very politic to say people do not pay enough for their product but there is a certain element of that in consumer electronics today. We have gone into a spiral of competition around fractions of a per cent. of margin. In the end there will be some very big losers. We are not there yet but in the end there will be some very big losers.

2023. They will go out of business and then margins will go up?

(*Mr Kynaston*) Absolutely.

2024. We have to go through that trauma before we get there?

(*Mr Kynaston*) Yes, absolutely. Let us start selling rice in Japan!

2025. One other question on personnel: do you send a number of people on short postgraduate courses to keep them up-to-date, such as courses as at Cranfield for two to six weeks?

(*Mr Edwards*) Yes, we do a lot of that.

2026. Do you find it valuable?

(*Mr Kynaston*) Yes. We also have an extensive in-house training scheme and management courses.

*Lord Kearton*

2027. It has been a fascinating afternoon but I do not get the impression that you are terribly sanguine about the prospects for the 1990s as far as this country is concerned?

(*Mr Kynaston*) Why not? I was speaking only about electronic equipment makers.

2028. Right at the forefront of technology?

(*Mr Kynaston*) Absolutely. It is unlikely that this country will attract other than inward investors in major investments in electronics components manufacturing, the area of semi-conductors or integrated circuits. We have one remaining company, the old Plessey company, which is now part of GEC, and we wait to see whether GEC is going to invest in it or not. They are competitive with us. They are quite competitive and I hope they are well looked after. I say that now from the United Kingdom standpoint.

2029. It has a tiny turnover, just a few hundred millions?

(*Mr Kynaston*) That is right, but be careful, it is in a particular area of application specific components, where those few hundred millions can get them quite a high market share. Their reputation is extremely good.

2030. The Managing Director gave an interesting talk.

(*Mr Kynaston*) Doug Dunn. He is a member of the Federation, so we know him. He is a very competent man.

2031. But you do not see us reckoning in a major situation at all?

(*Mr Kynaston*) I would have to say two things. Looked at from another standpoint, if you look beyond the manufacturing base you say, "Right, how is a United Kingdom company going to get into worldwide distribution?"



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Mr D KYNASTON, Mr D EDWARDS  
and Mr R BULLOCK

[Continued

[Lord Kearton *Contd*]

Take an example which is a success but beleaguered by problems—Amstrad. It is a success by its innovativeness. You have to assume that he has many, many good product ideas and to have been burned only once or twice is not a bad track record. But even he has not achieved anything in worldwide distribution. That is one of his biggest problems. So even if you have all the good ideas today, how are you going to compete with the top fifty companies that wrap themselves around the world? So it is no longer just having the good idea or even being able to solve the problems of making the product. You have to be able to sell it around the world.

Chairman

2032. If you were helping to write our report, what recommendations would you make for what government can do to help the situation improve?

(Mr Kynaston) I believe a return is possible. Yes, it is gloomy. It requires people with imagination, with the guts to fight which Mr Sugar, for instance, has. It requires that we have a government that supports industry, it probably requires that we do it via joint venturing to get those distribution channels

2033. With other European companies?

(Mr Kynaston) Other successful companies. I do not see why I should limit myself to European.

2034. When you say government support, do you mean stating that industry is of vital importance to the prosperity of our country, or do you mean financial support? If so, what kind of financial support?

(Mr Kynaston) It is no good trying to take over in established areas. So, for instance, I think there is very little purpose in anyone wanting to become a major in colour television from the United Kingdom. Those days have gone. Sugar will make a small amount of money doing that when he finally decides. Choose the new exciting areas, mobile communications, and somehow get the captains of those pieces of industry together to say how do we do it on a world basis? Take the exciting area of automotive electronics—that is dramatically changing. I think today 11 percent of the cost of a car is the electronics; within five years it is going to be about 20 percent; it will get to a plateau of over 30 percent. Take those exciting new areas and go for that market.

(Mr Edwards) But provide a forum that gives a framework for the market. What happens now is that you have maybe four or five years with competing technologies and no standards. The Teletext success, to come back to that, was because the Government provided a neutral forum so that industry could come together and come to a consensus on what they were going to do.

2035. You said that was very successful and was one example of DTI assistance to get Teletext off the ground.

(Mr Edwards) Hardly any money.

2036. How did they do it?

(Mr Edwards) Basically what they did was to provide this neutral forum for the allied industries to come together and debate what standards to adopt. Once you have got the standard you can design the chips and do all the other things because there is less risk.

2037. They agreed standards?

(Mr Edwards) They provided the forum in which the industry could agree. It was a neutral forum.

2038. Could more of that be usefully done in other fields?

(Mr Edwards) Yes, it could. I think the cellular telephone at the moment is crying out for it.

Lord Butterworth

2039. If I understood you correctly, there is a very important lever, is there not? The orthodox approach is to say that we are very good at invention and innovation, we are less good at producing the product. What you are saying is—it is almost the Japanese approach, I suspect—let us identify areas where we think we can break through in to a promising market and, having identified that area, that may be the responsibility jointly of government and industry to back it in terms of research and innovation. Have I got you right?

(Mr Edwards) Absolutely.

(Mr Kynaston) What you do is you get a head of steam up, you encourage better people towards the venture.

2040. I am sorry to interrupt but it is a very important thing. You are implying these operations like CEST and so on are on the wrong lines. You do not just try and identify some piece of innovation, some invention, you look first at what is the next profitable area where commercially we can break through?

(Mr Kynaston) I think the existing theory is there. If you study MITI, it has always identified areas and encouraged industry to move themselves out of areas like shipbuilding quietly and progressively into an area like satellites. It does it in a very mature way. What you get is a whole consensus going that does not necessarily get supported by vast amounts of money but you get a consensus going of will to do something, market-driven.

Lord Taylor of Gryfe

2041. You say, Chairman, it is a somewhat gloomy picture that is painted. Is not the key to it what you mention—globalisation? It does not

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Mr D KYNASTON, Mr D EDWARDS  
and Mr R BULLOCK*Continued*[Lord Taylor of Gryfe *Contd*]

matter to me whether it is a British-owned company or a Dutch-owned company, if you get the manufacturing capacity in the United Kingdom established. Your industry is a bit like the car industry a few years ago. In substantial deficit Rover was going out of existence until the Japanese came in and said, "Look, you have engineering capacity, you have a nice country to operate in and we will invest heavily in the manufacture of cars in the United Kingdom". Is not the future of your industry somewhat on the same basis? We have basic engineering skills; despite our limitations, we have some very good universities. Your industry requires trained and intelligent people. Would not the future of your industry be seen not simply in terms of a manufacturing industry under British ownership but under global or Japanese or some other ownership? Is that not the future pattern that could restore your industry to being a contributor to our balance of payments and providing skilled employment in manufacturing in the United Kingdom?

(*Mr Kynaston*) You speak as though manufacturing equates to industry. It is relatively easy to set up an assembly plant, but unless there is enough intellectual property development around that, all you actually own is a little assembly plant that can be written off in three years. One of the things we are arguing for as a Federation is that more pressure should be brought to bear on inward investors to establish a properly balanced contribution to our

industrial well-being, not something that can be removed overnight after three or four years. So, yes, let them employ outsiders, let them employ our production engineers and let them make a proper contribution to our industry and our community, not just sit here in our markets.

*Chairman*

2042. Some pressure is put on to Japanese companies coming in to say they have to bring their R & D as well as assembly.

(*Mr Kynaston*) Absolutely, but the actual presence of R & D. You have to be careful. Many of our customers experience this pressure but it is minuscule.

(*Mr Bullock*) In a sense we are already in this industry some of the way towards what Lord Taylor was saying. Just as an example, seven of the ten largest member companies of the Electronic Components Industry Federation are in fact not British-owned. So it is a global industry already to a large extent, although, as Mr Kynaston says, not enough of it may include actual intellectual property development as opposed to pure manufacture. But it is a global industry already.

Chairman] We are extremely grateful, Mr Kynaston. We hope we have not questioned you too hard. It has been extremely helpful and we thank you very much indeed.









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TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Tuesday 23 October 1990

**CBI**

*Sir Brian Corby*

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TUESDAY 23 OCTOBER 1990

Present:

Bruce of Donington, L.	Gregson, L.
Butterworth, L.	Kearton, L.
Caldecote, V. (Chairman)	Vinson, L.
Clitheroe, L.	Whaddon, L.
Flowers, L.	

**Examination of Witness**

SIR BRIAN CORBY, President, CBI, called in and examined.

*Chairman*

2043. Sir Brian, thank you very much for coming to help us with this inquiry. I think you know the broad intention of it is to find ways of making industry more competitive. I would like to start with a question which arises from an article in *The Times*, Tempus column this morning in the second paragraph (you have a copy in front of you), and this is about Lucas investing large sums of money in what can broadly be called innovation. It says, "Short-termism was eschewed by the Lucas board yesterday, but it remains the dominant theme in pricing a share; the market will continue to reflect the expectations for the current year rather than Lucas's undoubted potential for the mid-Nineties." Then it goes on to say, "A successful bidder would acquire a company with a heavy research and development spend behind it ...." etc. The whole inference being that the investment has made them more and not less likely to have a takeover bid made. That seems to make it less likely that companies will undertake the kind of investment in innovation which they should do for the future of their companies and national industry as a whole than in other countries where such attitudes are not so prevalent. Would you like to comment on that?

(*Sir Brian Corby*) My Lord Chairman, I have not read this article before but it is clearly an assertion of the journalist who wrote it. Whether it is true or not, I do not know. Clearly it brings to mind almost all of the issues that presumably you have been considering here, certainly the relationship between shareholders and the companies in which they invest. I wonder if I could begin with short-termism because I am afraid this has now become a slightly emotional subject and I wonder on occasions whether in fact the frequent use of the term is not actually impeding sensible debate on the issues, and perhaps clouding the real issues that arise. We at the CBI have recently had a presentation by Professor Paul Marsh, who is the Deputy Principal of the London Business School, and he did really quite effectively demolish the concept of short-termism as between the City and industry. There is a great deal of sense in the argument that he advances. That we in this country do tend to take a shorter term view than many competing countries, if I can call them that, seems to me to be clear. On the other hand, it is by no means easy to say that short-termism resides in one part of the economy only; I do not think it does. I am not trying to minimise the problems either, because if there is the perception of a

particular view being taken then that will condition people's behaviour whether the perception be right or wrong. That I think is an issue which has been discussed a great deal. If we relate it in particular to R&D, which is a special concern of your Committee, then obviously if companies feel that by investing heavily in R&D their share price performance will be impeded, they will possibly be reluctant to do so. If that is the case, what action should we take? That, I think, is what we should be addressing.

2044. We are looking not only at R&D, but at the whole range of innovation, meaning the use of knowledge to put into effective use new products and new equipment.

A. I take it you will extend beyond what we might call pure R&D to innovation such as that considered by the IAB of the DTI, and presumably you have got copies of their report.

2045. Yes.

A. We are in this country, I believe, relatively short-term in our thinking. That takes place in Westminster, if I may say so, as well as in the City and industry. We seem to lack continuity. Certainly, in my own view, that is very heavily conditioned by our inflationary history (which goes back over 40 years) and leads to high interest rates, not merely in nominal terms but in real terms and leads to increased uncertainty, and increased uncertainty on its own requires higher real rates of interest, and that I think is where the problem really lies. We need to change our attitudes with regard to inflation, and we need to reduce uncertainty.

*Lord Vinson*

2046. We have had quite compelling evidence given to us which shows that the real rate of capital after inflation in this country is, in round figures, double that of both Germany and Japan. As the whole capitalist system works on return to capital this is a handicap to British industry. That being so, what can we do about it particularly and peculiarly to our own tax structure, for example? I happen to believe that when we change from a national amortisation regime of so-called free depreciation to one of 25 per cent. diminishing balance it moves us from a situation of accelerating amortisation to one of retarded amortisation. I know the CBI has done some work in terms of budget proposals to get the amortisation rate improved from a 25 per cent. diminishing balance but, at the moment, where we

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SIR BRIAN CORBY

[Continued]

[Lord Vinson *Contd*]

have inflation running at 10 per cent. the replacement value of most capital goods is not even covered under the existing regime. In other words, nationally we are under-amortising extremely seriously. What is the CBI's current thinking on pressure on government to change the tax regime on amortisation of 25 per cent. diminishing balance?

A. Lord Vinson, you have raised so many issues in your question I do not find it easy to start. What is within our control in this country, and I would have thought the first thing we should be addressing our attention to, is getting our inflation rate down to the level of our competing countries; that I believe to be a medium to long-term issue, and not a short-term issue.

Nevertheless, it is important because one has to remember that just as there is a market for manufactured goods, so there is a market for money and the price of money is determined in a competitive market. If we are looking at rates of interest charged or expected to be derived by investors we have to look at the other competing avenues for investment of their funds, and that is what determines the rates of interest. Obviously rates of interest are very heavily affected by inflation and I think the most satisfactory medium to long term action that could be taken would be to develop a very strong consensus across all political parties that they were determined to exorcise inflation from our system. I think that is one thing we in industry would very much welcome. I recognise we are not going to be able to do that overnight. I recognise too that the problem has been with us for a long time and is not going to be solved readily, but it is to my mind the one single step that could have most effect on this. If we then look at fiscal considerations, there are a number which also are relevant. Firstly, fiscal considerations will have an effect on the level of retention of profits and the level of different pay-outs as we compare ourselves with different countries. Also on your specific point, yes, we would be in favour of more generous allowances for expenditure of the sort incurred in R & D and innovation. But this is part of a total package, this is not the sole answer to this problem.

2047. I have tried to reduce the argument from general to specific. At the end of the day we can all agree we want to control inflation, or gradually reduce inflation, but individually within that framework we detected handicaps of which the cost of money is a direct component or direct result of inflation, but within that tax regime the ability to recover costs is an entirely self-inflicted hurdle in that there is no reason why it should be a 25 percent diminishing balance, or a 35 or 50 percent diminishing balance. We can move from the present 25 percent, an entirely arbitrary figure, to a figure closer to 45 percent which would markedly improve the cash flow of the innovative company, so it is something we can do something about within the present climate. That is why I regard it as something rather important.

A. As something which would have a fairly short-term pay-off, in those terms it is a sensible step to take.

*Lord Gregson*

2048. Just on *The Times* article, one of the important points it makes is that a company that is a sitting duck for a take-over is one of the great weaknesses in this country. I sit on a German company's board and they think we are crackers to allow predatory take-overs to take place at the rate we do. Since the Massachusetts defence of BTR that view is now becoming widespread in the States. That means the Americans are dropping out of the free-for-all. That leaves us as the sitting duck of the world, in effect, for take-overs. Do you think this is a reasonable state to be in?

A. If we were in it, it would not be a reasonable state to be in, but I am not sure that it is as simple as that. I do not think you can take a transplant from one body and put it into another and expect it automatically to be acceptable. We have an entirely different system of corporate management in this country from that in Germany. I do not think you can take a bit of their system, put it into ours, and say it is going to cure our ills. It may or may not—it may make them worse. We have to look at the role of take-overs in our corporate life and that is the longterm protection against a non-performing management. We may or may not like it but that is in fact the situation. Also of course it is the situation where a well-performing management could be subject to a hostile bid. No doubt we could talk later on about the way in which shareholders, particularly institutional shareholders, respond to that sort of situation, but if we look at the United States some of the measures which are being taken in that country to protect their companies from hostile take-overs are measures which we, in fact, would all deplore, namely, the sort of poison pill and so on, which is very much designed to protect incumbent management. If I may refer to Germany for a moment, it is sometimes not well understood or remembered that the two-tier board system in Germany was actually introduced to protect the shareholders from management abusing their positions.

2049. It was a United Kingdom recommendation after the war.

A. It goes back a little longer in German thinking, I think.

*Chairman*

2050. Would it not be better, in order to keep management on its toes, or stir it up, for institutional shareholders, banks, lenders in the form of banks, and the like, to go to the management and say "We are not satisfied with your performance as such", as they do in Germany, and stir them up in a way rather than voting with their feet by selling their shares in take-overs?

A. The behaviour of the institutional shareholders varies from shareholder to shareholder, as I think



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[Continued]

[Chairman *Contd*]

Members of the Committee know. Not all institutional shareholders behave in that particular way; quite a number actually do go to managements and act in the way you indicated. Unfortunately the best way to do good is often by stealth in this area. Therefore, the occasions when it is most successful are not known, not indeed publicised. I have wondered on many occasions whether it would be better to do harm overtly than to do good covertly—but perhaps that is slightly perverse. We have to look at the situation and work out how best to handle it. There are plenty of examples. Indeed, it is probably better to ask industrialists for examples than to get them from me wearing my Prudential hat. For example, where we intervene in a company and changes are made, what we have to be very careful about in trying to act is not to imply that we know better how to manage industrial companies than management itself. We have to form a view as to the competence of management. If we are happy as to its competence to manage, we have to support it. I think the record shows on the whole many of the institutions have done just that. I could refer you perhaps to the evidence given before your Committee by Hugh Jenkins of the Prudential (H.L. Paper 47-viii, Session 1989-90).

*Lord Gregson*

2051. On the question of the take-over situation, you probably know that a number of academic analyses of take-over situations over the years can find no evidence of improvement in efficiency in the company taken over. In other words, the blunt instrument of take-over to improve management does not seem to work anyway.

A. Chairman, am I allowed to ask a question? Is it suggested that we should somehow or other introduce legislation that would prevent take-overs taking place?

2052. The suggestion may be that we should allow companies to introduce in their articles conditions such as exist in Germany, where no one shareholder can hold more than 50 percent of the votes. If any company tried to do that in this country you would hear the howls from one end of the country to the other, and rebounding from the Continent.

A. I think I am right in saying in Germany they also have ways of dealing with ill-performing management in the sense that the banks, who may be major shareholders, heavily intervene if necessary. I think the same is true of the major institutional investors here: they are prepared to intervene, they do not however normally have the same voice perhaps as German banks because they do not have the same degree of interest as the German banks.

2053. Is it not a better instrument than the blunt instrument of a take-over, recognising how much it costs both companies?

A. I have heard the Germans —

2054. The cost of a take-over battle.

A. Unfortunately there is no unalloyed joy in this world. Whatever system you have will have pros and cons. I have heard that some Germans are beginning to question whether, in fact, their own system does not lead to a degree of ossification about which they are slightly concerned. It does seem to me that we have in this country two options. One is to endeavour very hard to make the system we have work better (nobody argues that it is perfect—I certainly do not, there is a significant downside of what we have) or we go to a different system.

I do not believe, as I have said earlier, you can transplant bits of another system on to our system and expect it to work.

*Lord Clitheroe*

2055. On a different topic, how do you view entry into the ERM? To what extent do you think there is a major problem in relation to the sterling dollar exchange? Having been in industry for many years almost all the trading I was involved in was dependent upon having a stable sterling dollar relationship, and not a stable sterling European currency relationship. Do you feel that this going to be satisfactory?

A. I think I view our membership of the ERM as, firstly, inevitable. If we are part of the single market then we obviously should join the ERM, as we have. I have advocated membership of ERM for quite a long time because I feel if we look back ten years' hence it will not matter very much whether we joined last week, next week or the year before. These things have to be put into a historical perspective. One of the major benefits I see in joining the ERM, ignoring the discipline the Chancellor has talked about, is that we reduce uncertainties facing businesses. The future is bound to be uncertain, but I think for many years in this country we have endured a number of uncertainties we need not have, and one of them arises from our failure to join the ERM, which will put a degree of stability on the exchange rate. It may well be it has certain disadvantages. The particular disadvantage at the moment is that European currencies are standing high in relation to the dollar and, therefore, any business which is heavily dependent on exports to dollar denominated countries will in fact suffer. On the other hand, I believe I am right in saying more than 50 per cent. of our trade now is with the rest of the European Community.

2056. A lot of it is designated in dollars?

A. Yes, but the trade is in fact with Europe. One obviously recognises that the impact of joining the ERM at the current parity is very different according to the nature of the company's business. We cannot have it both ways.

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[Continued

*Lord Gregson*

2057. It is suggested in the *Financial Times* that the CBI have suggested 2.95 is too high?

A. I believe that suggestion was made, yes. We never actually suggested what a right rate was. We felt this was a political judgment.

2058. Would you like to make a suggestion as to what the right rate would be under the circumstances?

A. I am not wise enough to know the difference between right and wrong in this area. I think many of our members would have been more comfortable nearer 2.80.

*Chairman*

2059. Could we go back to Lord Vinson's point? Would not the objective which you referred to also be achieved by some form of inflation accounting which would prevent the inflationary element of profits coming in and, therefore, a tendency to distribute too much in dividends rather than re-investing in the company?

A. The effect clearly could be the same, but whether it would be desirable is arguable. If I can come to the indexing point for the moment. I am concerned if we really are dedicated to exorcising inflation from our system that we should do as the Germans do, almost make indexation of any sort illegal. It does seem to me, as I have already said that is our objective the most effective way of bringing home that we really are determined to get rid of inflation is to say that we should stop thinking about indexation altogether for all purposes. It may sound slightly dramatic against the background of the last 40 years, but it does seem to me to be a way through.

2060. It is a circle which has to be broken into?

A. Yes.

2061. Would not a great contribution to breaking the inflationary circle be partly to restrict the money supply, as is being done by high interest rates? But is not the other side of the equation that there is too much money, as Sir Stafford Cripps once said, chasing too few goods? If manufacturing industry produced more that would help the inflationary problem markedly and that is, therefore, an important objective also?

A. Unfortunately, we are dealing with a highly complex situation with a lot of variables, none of which are wholly independent. It is tempting I think to try to take short-term solutions to try to solve these problems. The danger is if you take short-term solutions they can be detrimental to the longer-term solution of the problem. That is why I have hesitation about introducing at this point inflation accounting at a time when, if we really are to make membership of the ERM effective, we have to anticipate the success of what we are doing. In other words, we have to anticipate that we really are going

to get inflation down. That is not going to be easy. It applies in wage bargaining and in all sorts of areas across the economy.

2062. I have moved on and have accepted your point that inflation accounting might, as it were, encourage inflation not to be taken so seriously. My point was that we must do something to break inflation, as you say. It is a circle of too much money and too few things for the money to buy. Would not, therefore, a substantial increase in the output of British manufacturing industry be a major contribution to the breaking of the inflationary circle?

A. Clearly, higher output of the products the market demands would mean less imports, which would have a satisfactory effect on the balance of payments and would enable interest rates to be brought down and would strengthen the exchange rate, and we would be in a much happier situation. It has been one of the problems for quite a long time now, since the Second World War. Whenever anything has happened to stimulate the market in this country the tendency has been for that demand to be met by imports; so any improvement in the level of output of British manufacturing would have to be applauded.

2063. You would agree that is a very crucial point?

A. If we could increase the ability of our own domestic economy to supply increased demand then it would be a very important step forward. I believe since the late 70s there has been a very significant improvement in the supply side of the economy, but obviously not enough to meet the increased demand brought about by the expansion of credit in the late 80s.

*Lord Kearton*

2064. On the evidence we have had so far the people doing the most investing here are the Japanese who are investing in electronics and motor cars. They announced last week that they would be investing in textiles. They are almost the only people willing to invest large sums on the assumption that they have a good export future.

A. I think the level of investment in this country has been lower than it should have been, be it in R&D, innovation as a whole, or otherwise. We should be very pleased that the Japanese are investing in this country. One of the prime concerns of government must be to ensure that the infrastructure is right to encourage investment here. For example, if we take the financial services sector in the City of London, if the environment is not right then the City will no longer be able to maintain its pre-eminent position in Europe and business will go elsewhere. Equally, if the infrastructure in this country for manufacturing investment is not right the investment will not be made here, whether the firm is controlled by British shareholders or by foreign shareholders.



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[Continued]

[Lord Kearton *Contd*]

2065. We must encourage inward investment with more R&D. For example, if you look at Telford New Town 50-60 per cent. of the inward investment is Japanese. It is a puzzle in a way. Many of the great British companies are saying they must invest more money overseas than in this country. The people who seem to see this country as a very good manufacturing base are the Japanese. How come they are, as it were, so bullish about the economy in this country, and what about our own domestic companies who are not?

A. You will have to ask one of the manufacturing companies as to why they take that decision. Presumably the Japanese feel that the quality of the labour force here and the infrastructure that goes with it is one that encourages them to invest here. Also it is probably easier for Japanese companies to invest here and exploit the market opportunities and the rest of the Single Market than it is perhaps for them to go to other countries within the Single Market, either for linguistic, legal or fiscal reasons, or because of regional encouragement.

2066. Only 10-11 per cent. of their overseas investment is here. We are not very dominant.

A. No.

2067. Going back to your original remarks, in these inquiries it always comes down to the same thing, we must change the culture. We have been trying to do that for 40 years. Lord Vinson came up with a very specific suggestion, but half the time we must come up with a very broad generality and change the culture.

Meaning what exactly? I tend to agree with what you say. If we really mean to get inflation out of the system we will have to take draconian action. At present in wage negotiations that is just not taking place. The change taking place in our adversarial electoral system is zero. Therefore, if one looks ahead, it would be very desirable but there is not a cat in hell's chance of it happening. So what?

A. I am sure, Chairman, to have a philosophical discussion as to the appropriateness of the adversarial system in this country is not the purpose this afternoon, but it is in fact one of the factors which I think underlines the difficulty of achieving continuity in our processes.

Lord Kearton] It is not purely philosophical. We have been to Italy, Germany, previously to Japan. One of the things that strikes one is that they do not have the adversarial system which we have here.

*Chairman*

2068. What is your view of the quality of management of manufacturing industry in the United Kingdom? Do you welcome recent initiatives in training for the management of technology, because it is very noticeable, as Lord Kearton pointed out, that there has been a lot of inward investment by the Japanese who seem to make a great success of the same labour force and same environment in this country which we all have. They

make a better job of it, it seems, than some of our managements do. So what is your feeling about the quality of the management in the United Kingdom? Do we need to do something about it, particularly in relation to their better understanding of manufacturing and the technology associated with it?

A. If I could take the second part of the question first, I do welcome the greater attention being given to training throughout the economy because I think it is absolutely vital and, indeed, it is not without interest that when a few months ago I visited the West Midlands Region of the CBI and expected to hear a lot of complaints about rates of interest and exchange rate and so on, perhaps because of my own interest in the subject, all the industrialists present said their main concern was with the quality of the labour force, the need for retraining and, more importantly taking the medium to long view, the quality of people coming out of schools entering the labour market. So anything done there must be good. I also heard debates about whether it is senior management that is lacking or middle management that is lacking. There is a management problem and there is little doubt that Japanese firms seem to operate here both very happily and very successfully. What have they got that we have not got? I am not sure what the extent of union representation is in those terms. It may be that merely putting in new Japanese management gets over the culture problem. I would readily accept it is a problem we keep talking about and do not seem to be able to do very much about, certainly not in the short run. I do not regard it as satisfactory for senior management to say it is the fault of middle management; it is up to senior management to change middle management if that is a problem. I think probably there is something about our management attitudes, maybe something about our union attitudes. Maybe we are still prisoners of our history. Certainly we have an anti-industrial culture in this country. I think probably the best description of this is by Professor Martin Wiener in his book<sup>1</sup> which I think is very explicit.

*Lord Vinson*

2069. Corelli Barnett?

A. I think Professor Wiener is more readable than Barnett.

*Chairman*

2070. Do you regard the business schools (particularly London and Manchester, the biggest two) set up to improve standards of management in British industry as having been successful or a bit too cut off from the nuts and bolts of manufacturing industry?

A. I think firstly there are not enough of them to have the influence they should. I think they have been successful within a fairly narrow range. What I am more concerned about is the people leaving our

<sup>1</sup> English Culture and the Decline of the Industrial Spirit 1850-1980.

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[Continued]

[Chairman *Contd*]

universities—the best ones ought to want to go into business (I use “business” in the wider sense) but they still do not want to do that. That is where there is a big difference between ourselves and Germany and Japan. Having said that, in Japan in May this year, the head of Nikkeirn, part of the employers’ association, complained that too many engineering graduates were going into the securities business, so perhaps we are not unique.

*Lord Gregson*

2071. They produce three times as many per capita as we do, so there are lots to spare.

A. I am not drawing a lot of comfort from that, Lord Gregson.

*Lord Butterworth*

2072. Do you think that the pay of young engineers has anything to do with their being attracted to the City rather than manufacturing industry?

A. Undoubtedly pay differences do have an effect, but so they should. Otherwise we do not believe in the market economy, which we do. I think there has been a bit of a shift, but I happened to be in Cambridge a few weeks ago talking to a number of people both at the university and also concerned with the developments in the two science parks on the road to Ely. They were making the point that a concern among engineering graduates was that they could go so far in a company but no further, that to some extent the most senior jobs seemed to be reserved for those who came up with financial disciplines rather than engineering disciplines. It is anecdotal and therefore I would not pursue it too far. But if that is the view among undergraduates, that will very much condition what they do because the people with aspirations for high responsibility will tend to go where they think they can develop them. There may be a communications gap between manufacturing industry in particular and the universities.

2073. We have heard a view put that the ablest undergraduates do not go into engineering at all. In other words, both engineering and industry are not getting their fair share of the ablest applying through the universities and polytechnics; they are going to go into insurance, commerce, whatever it may be, or the Civil Service, but now for too long industry has not had its fair share of the ablest.

A. I suppose this does change over time. I seem to recollect when I was leaving Cambridge in the early 1950s the ablest seemed to go into industry. But then that changed markedly in the 1960s and 1970s. I have a feeling it might be reversing a bit, but it really is a matter of industry showing itself as being able to give a good career to graduates and presumably to people at school before they make a choice of their university course. If, in fact, it is perceived that a natural science degree or an engineering degree tends to lead to a sort of dead end, then able students will be turned off.

*Lord Gregson*

2074. Your anecdotal comment from your student that the financial stream seems to go to the top more easily has been borne out by an analysis of the boardrooms where we have three times as many accountants on the board as journalists, three times as many as engineers, and three times as many as lawyers, but we are the only country in the world to have so many financially trained people in our boardrooms—the only country. So maybe this is a clue as to the management problem, do you think so?

A. I think it is all part of a picture. We cannot suddenly change it overnight. I think it is a reflection of our attitude to business, the attitude to business at schools and in the universities.

2075. Is it not also possibly a reaction of industries to the financial institutions? They have to have so many accountants in order to keep their wicket up against all these people that are trying to “short term” them?

A. I am trying to eschew the term “short termism”, but I am not sure that is right. I think there might be an element of rationalisation of a situation that we find in that argument.

2076. Of course, we pay three times as much in dividends as other countries in the world do. Is that the reason we have so many accountants on the board, to screw the dividends out of the company instead of ploughing it back into investment in equipment or R & D?

A. I think what is important is the level of profitability. I think I am right in saying the level of profitability of businesses in this country has been a lower level than that of many competing countries.

2077. Not recently, and dividends have gone up.

A. Over a very long period that was so.

Lord Vinson] It is also understated.

*Lord Gregson*

2078. The dividends have gone up faster than the profits.

A. Yes. We come then to say, what happens to the profits? I would argue in the first instance that the profits are there to be distributed to the shareholders. It is up to the company management to decide in discussion with the shareholders what the level of pay-out should be. If, as a result of that discussion, the shareholders are happy to take a low pay-out ratio, that is fine. Alternatively, the shareholders may agree with the management that it is a good idea to have a high pay-out ratio and rights issues if money is required for development. This is a matter of robust dialogue between companies, their management and their shareholders.

2079. The shareholders are winning, and I think that is the difficulty.

A. No-one is winning on that sort of argument.



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[Continued]

*Lord Whaddon*

2080. One or two parts of industry, and I am thinking in particular of the chemical industry, are far more successful than other parts. In the chemical industry I have the impression that engineers and scientists get to the board level much more easily than say in engineering. Do you have the same impression and, if so, why is that?

A. I think it is probably true that the chemistry-based industries are perceived to be more modern and more capable of development in the future than some of the more physics-based industries. I think it is rather more difficult in the physics-based industries to develop substantial R&D operations because, in fact, the product is not necessarily that much capable of further development.

*Lord Flowers*

2081. Like electronics?

A. Not like electronics, where there is a very special problem in this country. We are virtually out of the electronic development which is going on.

*Chairman*

2082. Some of us visited Germany recently and we had discussions with CBI's opposite number there, the BDI, and we were very interested to note that they were an organisation which represented manufacturing companies almost wholly, and did not have the broad cross-section of the CBI, which has to be all things to all men—financial, retail and the like. Do you think this might be something we ought to look at in this country? Would it be better to have a sharper focus in some big organisation that put the case of manufacturing industry and might do something to deal with the unsatisfactory balances we have been talking about?

A. I have thought about that a great deal because I am probably the first person from the financial sector to be President of the CBI. We cannot, on the one hand, say the adversarial nature of society is slightly adverse and, on the other, try to construct two bodies that might be adversarial. I would not regard that as wholly logical. It may be better to regard the CBI as a CBB—business rather than industry—if one is describing what we are at the moment. I suspect also that even if we were purely from a manufacturing sector there would still be a pretty heterogeneous group of people we represent; those who are trading in Germany and those who are trading in the United States, for example, and the current discussion on parity. I myself do not think that it would be a significant improvement, although it might. What I think we should be trying to do is not exacerbate the divisions but try to work constructively with them, accepting there are tensions. There should be tension between shareholders and company management. It should not be easy going. If company management is not doing very well they should not be insulated from the results. Equally, if shareholders are putting up

unreasonable demands there should be some way of ventilating the issues. What I would like to see is a much more robust dialogue between companies and their shareholders and the ability to argue if necessary in public without acrimony, because fundamentally they are on the same side. I think if we were to suggest the CBI would be better split into financial and industrial sections (I am not quite sure where you put the retailers in this) you would be introducing an unnecessary possible level of argument.

2083. How effective do you think current Government policies are in creating a climate in which innovation can flourish? Should Government play a more active part in prompting and encouraging innovation, as we found happening by and large in Italy and Germany which we have visited?

A. You will not be surprised that I tried to prepare some answers to these questions. Obviously anything can be better, but I do not really think there is a need for a great deal of, say, cash injection in this. We do need perhaps a sense of greater continuity in policy, and sometimes that is lacking, because changes in ministers tends to mean different policies, different initiatives, previous initiatives not got rid of but not pursued with the same enthusiasm. I do not believe we can leave this totally to the market, particularly when it comes to smaller companies. They do need advice and help, they do need to know where to go and where to get the help and so on. I would have thought Government has a distinct role to play there. I do not think Government can just walk away from this.

2084. Perhaps I can pursue the point about the SMEs, which naturally follows on?

A. Yes, their resources are limited as to people—a small company does not have a wide range of people easily available to it, nor does it necessarily have the finance. The CBIs Technology and Enterprise report did discuss at some length the role that government might play in specifically helping smaller companies in this area of investment in the future.<sup>1</sup>

<sup>1</sup> *Note by the witness:* The CBI's Technology and Enterprise report, based on a detailed assessment of member companies' views on DTI support for technology, made a number of recommendations for increasing the 'added value' of Government involvement. Two key recommendations were for the reintroduction of some single company R&D support for SMEs which by broad definition would presume a nearer market 'goalpost', and the provision of technological consultancy support for SMEs to encourage them to upgrade their technological competence. The large companies consulted during the review commented that they would not expect to receive Government support for near market research and acknowledged that they should be responsible for their own R&D.

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[Continued

*Lord Flowers*

2085. On another aspect of government support, have you any views about the wisdom of government withdrawing from near-market research?

A. I have to admit I have not really thought about it.

2086. Is it not a matter which one would expect industry to have a pretty firm view about? You may agree with it. Do you think that is the right stance for the government to take?

A. In principle I believe in subsidiarity, which means the government only does something for people if it is the only way of getting it done, or if it does it better than the people can do it themselves. One almost has to be pragmatic about this and look at each individual instance and decide whether it is suitable or proper for government to be involved or not against that subsidiarity principle. That is a matter for political philosophy I suspect.

2087. What about the government's policy towards basic research? What contribution does the science base make to industrial innovation? The science base is a particular area where the government is prominent, is it not?

A. Yes. We in this country do seem rather better at invention than putting into practice. We, as a people I think, have a very successful history of invention. We do not seem to have the same success in putting into practice. I suspect that the interface between research areas both within government and within the universities and the actual putting into commercial practice is something that needs a great deal of attention.

*Lord Gregson*

2088. The two exceptions to that are pharmaceuticals and defence equipment. In both areas there is very heavy government investment near-market, and that is extremely successful. Does that not indicate that the government really ought to get closer to putting the invention to work than they are at the present time? In those two cases they have and it has had a remarkable success.

A. The government clearly have an interest in defence, that is obvious; they also have an interest in the pharmaceutical sector since they are very big customers of the pharmaceutical sector.<sup>1</sup> I am slightly worried if we involve the government more than there is a clear need to do. My prejudice is not to involve the government unless there is a clear benefit from so doing.

2089. If we are going down the Swancee as a country, which we seem to be doing, is it not incumbent upon the government to look at the situation and, if necessary, to interfere?

A. I am not sure I am quite as pessimistic as you as to where we are going. I would have thought that we clearly have problems, some of them inherent and some historical.

Lord Vinson] It presupposes that the civil servants doing the judging have better judgment than the people currently taking the decisions, which I sometimes doubt.

*Lord Gregson*

2090. I am not suggesting it is the Civil Service. The Germans do not have a Civil Service anywhere near it, but do it through the trade associations, and spend three times as much as we do.

A. Are you suggesting, Lord Gregson, in some way or other the trade associations should decide, or second guess, more than the industrialists who are concerned?

2091. Trade associations run by the industrialists, like the CBI.

A. Sorry. Could I pursue that, if I am allowed to? How would you do this? Would you have the Engineering Employers' Federation, for example, determining how best the research spending of their members should be done?

2092. You could have the Requirements Board. We had that at one time in the DTI, staffed by industrialists. It was a very successful scheme which ran out of money.

A. But had we continued that and funded it, would we be in a less parlous position than we are now?

2093. Possibly.

A. Possibly, yes.

*Chairman*

2094. You would not think that case is proved?

A. I would be sceptical, Chairman.

*Lord Gregson*

2095. The Germans have certainly demonstrated it. The Japanese have.

A. Again I come back to being slightly hesitant about adopting a little bit of some other country's system.

Lord Gregson] We had a system of our own which ran out of money.

Lord Whaddon] You agree our own system needs modifying—you have said that several times. We can hardly do that if we constantly reject something which is being tried because it is done by other people. We are going to run very short of ideas.

<sup>1</sup>Note by the witness: "Pharmaceutical companies have not relied on the Government for research support to anything like the extent that defence suppliers have. What they have done is built up close relationships between the academic sector and MRC institutes to exploit the basic science developments coming along in the UK, and also drawn successfully on R&D worldwide."



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[Continued]

*Lord Flowers*

2096. I wanted to get back to SMEs before we leave them completely. We have touched upon it. The Government has recently announced a scheme which would once more put money into SMEs on a Single company basis to help them with their innovation and R&D. Do you know anything about this scheme and, if you do, do you think it is going to help the process of innovation in British industry?

A. I think I am right in saying Mr Hogg in a speech on 18 October put forward a number of ideas that seemed to us to be a very good thing and well worth pursuing, but the precise proposal I am afraid I do not know.

2097. Direct governmental contribution to, and even interference with, industrial policy.

A. Well, it sounds like deliberate government help and I think I would argue –

2098. Is there a difference?

A. I should argue as a taxpayer that, if the Government is helping, they ought to have some constraints on the use to which their money is put. Since I think it is common ground that not enough is being spent on investment in its broader sense, particularly among the smaller companies, then this is one way of stimulating it.

*Chairman*

2099. We have asked the DTI to let us know what is planned in this connection. We shall soon know more about this.

A. I am afraid I only know what Mr Hogg said in his speech, I do not know any more than that.

2100. Particularly for SMEs you would feel some help, not specified precisely, is needed?

A. Some help is needed there because of the limited resources, people and finance available to them as I mentioned earlier.

*Lord Clitheroe*

2101. In view of the thought that the structure is not quite right, and accepting that we start from where we do start, where should we be moving to and how can we achieve this? To what extent can government help or not help?

A. Without being boring, I would start off by suggesting we need more continuity and more continuity policy, and we need to get inflation out of the system. I think if we take those as read then I believe we ought to be doing or aiming to do three things in relation to companies. One is to ensure that management is properly accountable to the board. The second is that the board is properly accountable to shareholders. Thirdly the shareholders should accept a responsibility as shareholders. Those are probably all “motherhood” statements. I think they are very important. I think we are a long way from achieving any one of those three, let alone all three.

I think we should be directing our efforts to that end, that is, indeed, making our system work better. It does mean that we might have to look again at the composition of company boards. Do we have enough non-executive directors? Is there anything we should do about it to make that system more effective? Do we have adequate accountability from company boards to their shareholders, and do we need to look again at the question of shareholder responsibility for companies in which they own shares? One has to accept that there are many different views on the part of the large institutions as to what their responsibility is. Some I think would take the view that they are looking after other people's money in a fiduciary capacity and therefore the best thing to do is to sell out and they will do so. Others take the view that they invest for the longterm, they maintain a dialogue. I think that is what I would regard as better practice.

*Lord Gregson*

2102. Would you separate the offices of chairman and chief executive, as the Americans mostly do and the Germans always do?

A. My strong prejudice is to separate the two offices for this simple reason: if a company is going well, it does not matter what is happening; if something is going wrong, if you have separation of roles, it is more easy to take corrective action. That said, there are plenty of companies that work very well with the roles combined.

2103. For so long.

A. For so long, until the chips are down—then I think you want to be certain as shareholders that there is a mechanism in place to deal with that situation. I happen to believe it is best done if the roles are separated.

*Chairman*

2104. Coming back to the subject of our investigation, do you believe the separation of those two offices is more likely to stimulate the innovation that is required in any company to make it prosperous in the longterm?

A. I think in the sense that that improves corporate governance the answer must be yes, and also, if you say the hostile take-over is the last resort when a company management is not performing well, if you separated the roles it might be that much easier to prevent having to go to the last resort. My answer would be yes.

2105. In that the chairman and his non-executive directors would, as it were, act for the shareholders, push the management?

A. Say, “You are not doing very well, we have to have a change”, which is what happens in Germany without the take-over.

2106. Do you wish to say anything more about short term money? We started with that.

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SIR BRIAN CORBY

[Continued]

[Chairman *Contd*]

A. Perhaps I could mention one other aspect about which we have not talked in the short term debate. What is sometimes brought up is the role of trustees of pension funds. Good practice, to my mind, entails trustees and those who are investing their money agreeing on the objectives, and the investment managers would then expect to be judged according to those objectives. Trustees should use the objectives for consistency in the judgement process. You might, for example, agree that you are not going to invest heavily in take-over stocks. Fine. If you do that and there is a heavy burst of take-over activity, then it would be quite illogical for the trustees to be surprised that your performance in the short term is not as good as it otherwise would be. This is a matter of proper dialogue between the parties involved which, as I said before in relation to shareholder-company relations, should be robust and direct.

*Lord Gregson*

2107. We have been told that it requires a better definition of the role of the trustees in law. At the present time any trustee who does not do the best for his client can be vulnerable.

A. We are having that looked at. I think you will find that the definition of trustees' duties is not as narrow as perhaps people might feel it comforting to tell you.

Lord Gregson] It is not well defined.

*Lord Vinson*

2108. Do you think the tendency to reward senior management on a profit annualized basis has a subconscious effect towards short term? In other words, industry should examine itself for ingrown or home-grown attitudes for the short term before it necessarily criticises the institutions?

A. The brief answer is, yes, absolutely. Certainly some of the schemes which are introduced tend to force senior executives to concentrate on a short-term perspective.

*Chairman*

2109. You would prefer a longer term kind of share option?

A. Over a three or possibly five year term.

*Lord Kearton*

2110. Short-term perspectives making for some imaginative accountancy practices?

A. Again, I can only give a short answer, Chairman, yes.

*Chairman*

2111. Could we pass on to some of the marketing aspects. How successful are United Kingdom companies in assessing markets and responding rapidly to new opportunities, which the Japanese do seem particularly good at? Are we

sufficiently aware of the activities of our competitors, particularly with regard to the subject of our investigation? Would a better market perception and more knowledge of our competitors stimulate more effective innovation and so make our companies more competitive?

A. I think I have said before that we seem to be less good at producing and selling than many of our competitors, indeed, we almost seem to get frightened sometimes when a Japanese competitor moves in. It may be, going back to high interest rates, we need to take the shorter perspective in order to justify the investment, and the investment can be very substantial and the pay-off period can be quite long. If perforce our manufacturers are required to look for a rate of return 10 or 15 points higher than that of the German or Japanese manufacturers then I think we will be that much more reluctant to go ahead and invest. Coming back to shareholder relations, it is certainly my own company's experience that honest dialogue does actually get away from quite a lot of the perceived problems if a company management are prepared to talk quite openly. If manufacturing management are not quite sure themselves on the grounds on which they are moving it is not surprising they are hesitant to put their views forward and blame the others.

*Lord Gregson*

2112. There is a little problem about dialogues with institutional shareholders and that is that the listing requirements of the Stock Exchange require you to inform all your shareholders of the same information you give to any individual shareholders, and the second one is the insider trading problem.

A. I well recognise the problem.

2113. Is it not time the CBI girded their loins and came forward with a solution to this problem? Even Nicholas Ridley's shareholders committee fell foul of both those areas. Legally at least my lawyers tell me that on insider trading there is no way out at the present time.

A. Any institution shareholding will from time to time find it impossible to deal because they become apprised of information. That is a risk you take when you accept the responsible position as shareholder. We all accept that. It may or may not be a disadvantage, and on the whole I think it is an advantage to take the positive role of the shareholder. I do not believe we need to be as cautious as all that in telling all our shareholders. Sometimes we are too secretive, and do not need to worry about our competitors if we do not think they know our secrets because they cannot be worth worrying about. We can be much more open than we are in telling all our shareholders. We do not have to tell everything to all our shareholders, but to the extent we have information which we can properly give, we have to be prepared to tell any shareholder that asks.



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SIR BRIAN CORBY

[Continued

*Chairman*

2114. Could we just come back to the point about the no dealing restriction. In 3i we had many shareholders in publicly quoted companies and we had a list of companies which we knew all about because we had insider information because of our close relationship and our knowledge of the management and the success or otherwise. We had a list of companies with which we were not allowed to deal. Should not that practice be extended further, because at the moment there seems to be a fear that the managers of funds cannot deal if they become really knowledgeable about a company? Should they not accept that more often and therefore become more knowledgeable on the company and be in a better position to stir up its management if it is failing, and therefore get closer to the German practice, without changing our shareholding structure?

A. I do not think I am equipped this afternoon to give you an answer to that question based on the facts, which I would quite like to have, as to the number of times when a large institutional investor might be inhibited from dealing because they have become apprised of information or they have deliberately sought out information. There is a difference between the two. Perhaps I could write to you on that point.<sup>1</sup> I would rather not speculate on it without information being available to me.

2115. I think it is quite an important factor in this question of shareholders getting closer to understanding companies and therefore dealing with a situation when the company is not performing.

A. I can speculate but it would be a lot easier if I had some facts.

2116. We have touched on the contribution that near-market research could make to effective industrial innovation. Is there anything further you would like to say on that to make exploitation of research knowledge more effective? Has the government got a part to play? Is there anything that needs to be changed within industry, or in the research universities or research councils and the like?

A. Certainly I have mentioned earlier I paid a visit to Cambridge and was very impressed by what was being done in both of the science parks on land which I believe is owned by St John's College and the neighbouring one which is owned by Trinity. That is a way of getting ideas which have developed within the university off the ground commercially.

Lord Flowers] I think those who have had to deal with those science parks now say, although they have been successful in their own right and have brought some money into the pockets of the two colleges, they have produced very little interaction between firms on the science parks and the University of Cambridge or any other university. It

was a nice idea to have them and they have undoubtedly done good but have not served their original purpose.

*Lord Kearton*

2117. There has also been a very high failure rate in recent years?

A. There is likely to be a high failure rate in that type of activity.

2118. There has been in Cambridge.

A. It is very much venture capital. There does seem to be a need to strengthen the interface between the universities and the manufacturing sector of the economy, I would accept that.

*Chairman*

2119. How important is collaboration in industry, whether horizontally between competitors or vertically between customers and suppliers. With collaboration horizontally, one example is collaborative research in the pre-competitive phase. Would you like to see more of that? Would that be helpful to innovation? Secondly, would you like to see more collaboration between big customers and smaller suppliers, such as is practised by Marks & Spencer very effectively to give notice of what their requirements are going to be in future years, and to set standards of high quality to which their suppliers can respond effectively?

A. On the first, the horizontal collaboration, the government has a LINK scheme which seems to have been fairly slow to get off the ground. I understand one of the problems is intellectual property rights which could inhibit collaboration here. I am not close enough to the issue to say other than I am aware that this has been a difficulty. Clearly also the stage at which this collaboration takes place is important, because as you go further down the production process so the collaboration becomes that much more difficult. You might have other problems. It does seem to me to be important, given the costs of much of the development that we are possibly considering, that we do encourage collaboration to ensure resources are adequate. On what you might call the vertical collaboration, that is between supplier and eventual user, then clearly one cites Marks & Spencer as a very good instance of where this has worked satisfactorily. I would have thought that is something which should be encouraged. There are plenty of examples of good practice such as Marks & Spencer which could be used.

2120. Is it fair to say it is not widespread but happens more frequently than it used to? Would you feel it is something the CBI could contribute to so as to prevent the situation arising where a big company requires a new component of a particular standard, asks British industry for it, finds it cannot make it and so goes abroad to purchase it? That is prevented if the requirements are known by the company.

<sup>1</sup>See page 340.

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SIR BRIAN CORBY

[Continued]

[Chairman *Contd*]

A. I have brought with me, Chairman, two CBI publications on this subject. I do not know whether they have been made available to the Committee. One is "Profit through technology: a guide to sources of help in technology transfer". The other is "Managing Innovation".

2121. If you can leave those, we would be very happy.

A. I have a third one, a summary of the first innovation trends survey we carried out. I would very happily leave them with you.

2122. We have seen the innovation trends survey but not the other two publications.

A. They do relate to the issues we are discussing. I will very happily leave them.

*Lord Kearton*

2123. Experience so far has not been very encouraging on collaboration. We have had ESPRIT. We are now in the second run round and we gave it what you might call modified blessing as an experiment. We spent a billion pounds or so the first time round. The second time round we are halfway through a programme and there is a good deal of disillusionment about it in Brussels and in Italy as well. Equally the LINK programme has not been any better. The whole business of getting pre-competitive collaboration does not look as if it is going to be a very strong help to get over our national troubles. In fact, we have lost ground in the information technology industry and we are losing ground still. We had evidence last week from Philips Components which was not optimistic and when we were in Italy we found the fact that ICL was bought by Fujitsu was regarded as throwing our hand in completely.

A. I had heard that. My view on the collaboration is that it is more likely to be effective, certainly in the short run, at a vertical rather than horizontal level.

2124. The Continental experience is they are much keener on EUREKA, something they are going to make and sell, rather than a complex of pre-competitive research. We are not anything like as much engaged in EUREKA as the Continentals are. Has the CBI any views on all this?

A. I have not thought about this as a specific issue. Again I will come back to you, if I may.<sup>1</sup>

Lord Vinson] Could I return to a fairly simple proposition? Evidence shows that the cost of capital in this country is virtually double the cost of capital that a Japanese company would need to develop the same innovation, so we have (exactly the same applies to America) an enormous hurdle in terms of the introduction of new ideas. If that is the case, what can you do about it? Okay, get inflation down. Besides that there are two possible remedies. One is to allow companies to use their own self-generated

funds to a greater extent. That brings me back to the amortisation point. I think that is so critical. The other is to allow companies to use their own funds but actually give them a bonus by way of a tax credit on their research and development. I know that can be cooked up in all sorts of different ways. In fact, it means they could, for example, write off 125 per cent of R & D, not 100 per cent. A company's own capital is the cheapest capital it has got and, therefore, it is a very important source in terms of capital for innovation when other forms of capital are so expensive. I would like to leave the thought with you that in an attempt to try and improve innovative invention and investment in this country we look at possibly the only two routes currently open to us. One, the accelerated amortisation route. Two, an investment credit or tax credit. Both mean the use of the company's own capital. I accept in the latter case you are reducing the total flow of funds to the Treasury. So that the second case does cost the taxpayer more, but I wonder whether that might not be a route to try and increase the flow of funds because increasingly one hears "If we had more money we could do it. If we had cheaper money we could do it". The hurdle is the huge cost of money relative to what the Japanese have. I think it is a real problem.

*Chairman*

2125. Would you like to comment on the second proposal, a tax credit on R & D?

A. If you take the longterm approach, which is to get interest rates down in line with inflation coming down, we are not going to achieve that overnight. It is therefore reasonable to look for palliatives to deal with the shorter term problem. How do you get from A to B? I would have thought the ideas are worth consideration because they would actually ease the flow of funds within a company for investment in R & D, innovation and so on. It seems to me that we have a longterm solution, if you like, getting interest rates down in line with our competitors, which we are not going to do overnight—one has to accept that—in which case we should look for palliatives, as I say. The ideas of Lord Vinson, particularly the second—a bonus for R & D—should be regarded as a palliative and something to be taken away when the need is no longer present. Otherwise there would be a distortion in the system in future.

*Lord Kearton*

2126. I want to go back to what Sir Brian said at the beginning. Six weeks ago today I heard your colleague John Banham at the Guildhall. The first part of his speech to the assembled industrialists was "Don't talk Britain down. We have done an awful lot, made a tremendous amount of progress over the last ten or eleven years", and he painted a very good picture. Then he outlined the sort of problems we are concerned with in this Committee and said that it could not change just like this and at the end of the day it really called for action on the part of everybody present, which on present signs is not

<sup>1</sup>See page 340.



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SIR BRIAN CORBY

[Continued

[Lord Kearton *Contd*]

going to be achievable in the sense that we have to have a complete change in attitudes towards inflation, draconian measures, self-restraint on the part of the unions, self-restraint on the part of employers, as Mr Major said the other day the right Government attitude, recognition of the importance of manufacturing industry, and so on. "At the end of the day, unless you chaps go out and preach this point of view, god help us in the 1990s." So we had two things there: we did extraordinarily well in the 1980s, do not knock Britain down; then he says unless we have a seachange the 1990s will not be very good. What is your view?

A. I very much agree with that. I think we have achieved a great deal in the 1980s but equally we have a number of significant problems. These relate to under-investment publicly and privately, in training, education, transport—these are the three that come to mind. Unless we can solve those we really do have problems. Training and education seem to me to be pretty well at the top of the list.

2127. You cannot do anything about it overnight. If you started tonight with maximum priority on education, it is no overnight job to get the education system right.

A. That is why I believe very strongly that it is a matter of securing a continuity in policy. That is very badly needed.

Lord Kearton] It comes back to my original point of a non-adversarial operation.

Chairman

2128. Sir Brian, due to there being only one witness this afternoon I am afraid we have submitted you to more gruelling questioning than other witnesses. We are extremely grateful to you for answering our questions and giving us so much of your time.

A. Thank you, Chairman. You have given me a lot to think about.

**Note prepared by Prudential Portfolio Managers Limited  
in connection with Question 2114**

**CONTACTS WITH UK LISTED COMPANIES**

1. Meetings occur as part of our regular contact with the management of companies in which we invest and also at the request of the companies to discuss specific issues.
2. When price sensitive information has been received no dealing in that share is permitted until the relevant information is in the public domain.
3. There are many reasons for receiving price sensitive information (i.e., in advance of the public). Often a company wishes to raise capital, for whatever reason, and discusses the matter with PPM in our capacity as existing shareholders, as potential investors and as potential sub-underwriters. A second very important reason is when PPM has invested in companies where problems have subsequently arisen and constructive participation in solving these problems is appropriate.
4. Our recent experience has been that in any one year we receive price sensitive information in respect of 160 companies (some 16 per cent of the companies in which we invest in the UK). The period of time during which no dealing is permitted varies according to the circumstances but would tend to be quite short (averaging less than a week) when the reason was related to raising further capital.
5. We believe that where there is a well structured board with strong independent non-executive directors there is no need to get closer to the German practice in order to ensure the long-term success of the company. However, we are prepared to take the necessary steps to ensure that such a board structure is in place.

**Note by the CBI in connection with Question 2124**

**SUMMARY on EUREKA and ESPRIT**

The Sub-Committee (Lord Kearton) also requested the CBI's views on two European research programmes, EUREKA and ESPRIT. We have not given any recent close consideration to either of these but have in the past welcomed their role, especially since their funding is usually seen to be on a more realistic basis than sometimes obtains in the UK.

In 1988, we responded to the ACOST study of the EUREKA programme, when we found CBI Members had experienced no great difficulty in obtaining EUREKA status, whose Secretariat was helpful, and they were generally satisfied with their involvement. Some projects would not have gone ahead without the scheme.

When, in November 1989, we submitted evidence to the House of Lords European<sup>1</sup> (Sub-Committee B) on the European Commission's proposal for a new Framework Programme, we included, without

<sup>1</sup>Communities Committee.

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specifying, ESPRIT in our overview. We felt that Information Technology qualified as a research area requiring a supra-national approach, in which Europe was already strongly based. The main point made by CBI Members was that European research was increasingly important, due to the decline in resources allocated by national governments. Although the balance of funding was broadly acceptable, we suggested that some other areas should take greater priority at the expense of—but not to the exclusion of—information and communications technologies.

One principle that the CBI holds in relation to these European research programmes is that the funds subscribed by the UK Government should be additional to and not instead of, funds in support of national research projects.

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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY  
(SUB-COMMITTEE I)

Wednesday 14 November 1990

*Sir William Barlow*  
*Sir John Harvey-Jones*

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WEDNESDAY 14 NOVEMBER 1990

Present:

Butterworth, L.  
Caldecote, V. (Chairman)  
Erroll of Hale, L.  
Flowers, L.

Gregson, L.  
Kearton, L.  
Taylor of Gryfe, L.  
Whaddon, L.

**Examination of Witness**

SIR WILLIAM BARLOW, called in and examined.

*Chairman*

2129. Sir William, we are very grateful to you for coming along to spend time with us this afternoon and give us help from your wide experience. What do you believe are the main obstacles to innovation in the United Kingdom to increased investment in manufacturing industry? I know that it is a very broad question and can perhaps only be answered with a few highlights.

A. Thank you, my Lord Chairman. I do find the question a difficult one to answer because I am dubious as to whether there are real obstacles. What I think is more the case is that there is a lack of national will, national pride, about innovation in manufacturing industry, and there is precious little interest and encouragement from the Government. There used to be, but it seems to have died away. There is of course a great difference between sitting where I am sitting in a big company and looking at it from the standpoint of individuals and small companies, would-be innovators, who find it difficult to get past the initial concept stage because of lack of finance. However, in the case of large companies I think that they ought to be able to carry out innovation programmes. There are plenty of firms doing very well. Of course, you touch on it in a later question, my Lord Chairman, but I should like to mention this now: when you have ideas of innovation you have to have a market for them. It is chicken and egg—do you assess the market before you start the R&D or do you try to find a market for your pet innovation when you have done it, and the latter can be a disappointing process. But quite a lot of innovations of large firms have to be sold in the end to government utilities, or they have been until recently, the defence industry and so on, and there of course one's rate of progress in the end is affected by the attitude of the Treasury to innovation. To come back to the initial question, I find it difficult, in a nutshell, to talk about real obstacles.

2130. May we just narrow it a little bit. To take an example, you were mentioning "unless you have a market". There has been an enormous market, for instance, for the fax machine. There is no British design to manufacture the fax machine so far as I know. Why did British industry, for instance, lose out on something that it was pretty obvious was coming?

A. In fact there were British firms in the fax machine business driven out by foreign owned firms so the fax machine market in this country is dominated by the Japanese with a large German content. The early endeavours of British firms were

squashed out by large foreign owned companies, which eventually established manufacturing units here.

*Lord Flowers*

2131. May I ask Sir William to elaborate on something that he said, my Lord Chairman. Sir William, you said that government interest in innovation has waned, if I understood you correctly?

A. Yes.

2132. That means that there was interest once and now there is not. I am wondering whether you can be a little more specific. What were the reasons, do you imagine, for its waning?

A. The Department of Trade and Industry had a programme which encouraged innovation and put finance behind worthwhile projects. That scheme has been run down to be virtually non-existent. You asked the reasons for that. The reasons are a change in the political approach to the role of the Department of Trade and Industry. The Department of Trade and Industry is in two halves, the trade section and the industry section, which have been together and separated at different times; but the industry section is being deliberately run down. I should like to talk about that a bit more because I think that it has an effect upon manufacturing industry and development that is potentially very serious.

*Chairman*

2133. You would like to have seen the continuation of the requirements boards, for example, would you?

A. Yes, I would, and I would like to see the continuation of the sponsorship sections in the Department of Trade and Industry, which took an interest in specific industries. That has been abolished. I think that it is a great loss.

*Lord Taylor of Gryfe*

2134. What kind of support would you visualise as being necessary from government sources in order to reverse this decline?

A. The sort of schemes that provided money to go into innovation projects was particularly useful for the small and medium sized firms. The restoration of that I think would be very helpful. It was always a great difficulty, Lord Taylor, that when money was being dispensed according to certain rules large companies were as entitled to receive it as small ones, and that led to a strong body of opinion saying, "They do not need it, and this is wasting government

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SIR WILLIAM BARLOW

[Continued]

[Lord Taylor of Gryfe *Contd*]

money because these large firms ought to have done it on their own". Financial assistance towards innovation projects for small and medium sized firms therefore would help as a stimulus because quite simply they often run out of money.

*Chairman*

2135. What would you say were the main objectives and successes from those schemes of support? There was the Support for Innovation scheme, the SFI, and there were the requirements boards. What did they do that firms could not do for themselves?

A. In some cases they kept them going on the programme of whatever it was that they were doing.

2136. Which they could not afford themselves?

A. Which they would not have been able to afford themselves. A lot of this is psychological, my Lord Chairman. The absence of national and government interest in, first of all, manufacturing industry, let alone innovation, is in my view a handicap. That handicap is not borne by our main competitor countries. The main ones today being Japan and the larger countries of continental Europe, Germany and France. It is one of these intangible things. If I am asked to quantify and to give you examples, I cannot do that, certainly not this afternoon on the record in this House. But I feel very strongly that this lack of support, interest, public encouragement, is one of these intangible things that are having effect.

*Lord Flowers*

2137. Is it unreasonable for the Government to say that everyone wants anything if someone else will pay for it?

A. That is the sort of thing governments do say. I have never believed that.

*Lord Taylor of Gryfe*

2138. Does this not involve civil servants picking winners to back, and this has not been notably successful in the past?

A. If you believe, Sir, that it is civil servants who do the picking you would be right. But very often the arrangements that have been in force have had outside experts sitting in committee advising Government on particular cases. I have sat on those sort of committees, I have chaired them, and the civil servants write down what we say and it is acted on, so I do not think that that is so.

*Chairman*

2139. That was the case in the requirements boards. They were mainly industrialists, were they not?

A. They were. The advisory board, which still exists, has always operated in that mode. The Ferrous Foundries Commission, which I chaired many years ago, was the same sort of thing.

*Lord Taylor of Gryfe*

2140. Do you see any fiscal systems that the Government could introduce that would stimulate innovation, particularly in the small and medium sized firms?

A. I do not come today with any suggested plan as to exactly what we should do, but I make the assertion that when there are schemes with government funds going in to support it is my belief that it causes things to happen that would not otherwise have happened. You could well go on to say: well, that should not be the case, industry should look after itself, and so on, and this is what politicians tell you. There has been in the past in my view positive progress made as a result of some of the government schemes that used to be in position.

*Lord Kearton*

2141. I am interested in Sir William's feeling about loss of interest, which is rather critical, and I agree strongly. Members of this Committee have visited Italy and Germany, and related committees have visited Japan, France and so forth. There is no doubt that the feeling that industrialists overseas have is that government regarding industry as the mainspring of the national well-being has an enormously beneficial effect on their attitude. You get much more spirit in these countries. It is most noticeable. The Japanese good management of their industrial relationships comes down to the fact that people do better if they are encouraged and personal interest is taken in them. But you think that this lack of interest on the part of the Government has a very depressing influence generally?

A. Yes, and perhaps I may just follow up on this. In the last decade—certainly for two thirds of it—the Government was rather fond of extolling the virtues of service industries as though they were some substitute for the success of manufacturing industry. As that has been seen recently not to be the case, I notice that the assertions are rarely uttered now, but it was a very common theme coming out of the Government. It has not been replaced by statements, speeches and evidence from senior ministers that they believe that manufacturing industry in this country remains a very important part of the wealth creation of the country.

2142. But it goes further than that surely? Mr Marita of Sony in Japan was interviewed a week or so ago in a television programme and he said that the reason for this country's industrial decline was precisely because they had ceased to recognise that good industrial performance is the whole foundation of national well-being. He thought that we had lost our way very badly by losing sight of what he called that elementary fact. You obviously go along with that?

A. Yes, that is what I am saying. I believe that to be the case.



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SIR WILLIAM BARLOW

[Continued]

*Chairman*

2143. Perhaps we may pass on to management. I guess you would agree that it is the prime responsibility of industrial management to invest in innovation, indeed, all the investment that is necessary for the future prosperity of their companies. How do you view the quality of British management of manufacturing industry? Is this a big factor in the decline of our manufacturing industry, do you think?

A. The quality of management is the key to success in any sort of business, and that is so in manufacturing industry where the quality of management in manufacturing industry has improved greatly in the last ten, 15 years. There is a whole new generation of people coming through who are better trained. There is increasing interest in the management of the manufacturing process end to end with new systems of manufacturing and in the better manufacturing companies you see various new activities taking place. That will produce better results. More managers are being trained in the specifics of how to run a manufacturing company. I am not talking just about managers who have been to business school because in fact business schools do not train in specifics, but from the various courses available elsewhere. One of the things that is absolutely vital, however, is that management continues to be trained throughout careers. Continuing education and training—CET—is something to which we must give a lot more thought. I am Chairman of the Engineering Council and the Council has conducted a pilot scheme of introducing a disciplined continuing education programme, into companies for their managers. We aim to spread that more widely now that it has been proved to be effective. Incidentally, the Government there has been helpful with finance and the Department of Education and Science has provided pump priming finance to the Engineering Council to carry out its one-thousand management engineer experiment. We aim to go on with that. From here on, however, it will have to be voluntary and paid for by companies because the Engineering Council has no money. We intend to persuade companies that a disciplined approach to continuing education and training will be in the interests of engineers, of managers and of the companies. To come back to your first question, my Lord Chairman, I think that the standards are improving quite markedly.

*Lord Gregson*

2144. You say they are improving, Sir William. It has not shown through yet in the balance of payments in manufacturing industry, which is steadily growing worse.

A. The balance of payments total picture is more than whatever manufacturing industry is —

2145. No, I said balance of payments in manufacturing industry.

A. Yes, but I am just questioning whether that is a relevant statistic on its own.

2146. It is produced on its own and it is very relevant to the economic viability of the United Kingdom.

A. I have argued, I have pointed out, how in the electrical industry we exported more than was imported and that has changed so there is an industry that has —

2147. But it has not improved recently, it has got worse?

A. But I do not know whether you can blame the quality of management for that.

2148. What else can we blame for it? That is what we are trying to get at.

A. Unfair trading practices, for example.

2149. The Germans do very well and they do not have any different trading practices from ourselves. We are in the Common Market. We have an enormous negative balance in manufactured goods against Germany.

A. Well, you say that . . .

2150. It is a fact, Sir William. If British management is improving —

A. Let me just give you some evidence of why the quality of management in manufacturing is better. The evidence comes out in the improved results that have been obtained from the better manufacturing companies in this country. In the last few years they have generated more profits than they had been doing. That is factual. The improved productivity that has caused the improvement in profitability continues to improve.

2151. But the manufacturing sector as a whole has been shrinking?

A. Yes, it has.

2152. And it is still shrinking?

A. It has shrunk as a proportion of gross national product, but part of that, Lord Gregson, is due to the fact that about 25 per cent of manufacturing industry in this country was wiped off in the 1980 recession.

2153. And never been restored?

A. And never been restored.

2154. Is that not the fault of management?

A. As a manager I do not feel like taking the blame for that! It was not management that put inflation rates up to 22 per cent or interest rates up to 19 per cent or the dollar to 2.4. I do not really feel that to be the fault of management!

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SIR WILLIAM BARLOW

[Continued]

*Chairman*

2155. How do we get back from having lost a lot of manufacturing capacity in that recession to which you referred? What should we do now to recover some of that lost capacity? That is what it is all about, is it not?

A. Yes, I would rather speak to that, but I come back to the point that I made earlier on. I believe that this should become a main plank of government policy. The Government should play an active part in encouraging manufacturing industry. The first thing needed is a government department that is charged with doing just that. Instead the department of industry—part of the Department of Trade and Industry—is being dismantled in a cynical, rapid, throwaway fashion. The number of civil servants who were concerned with industry there has been reduced drastically. Most of them are out on the streets looking for a job. It must start with a national commitment to major on, expand, encourage, demand, a more effective manufacturing sector.

2156. And the implementation of that view and policy would be what is called launching aid in the aircraft industry or pump priming in order to stimulate industries that have declined?

A. Yes, there is a whole range of specific things—taxation, investment encouragement and so on—that can be done. I am hesitant to come here and talk about the specifics. What I would prefer to talk about is the need for a supportive, encouraging, interested government approach to this subject. From that, many other things can follow.

2157. A climate of attitude to manufacturing industry?

A. I hate to use this in something so serious, but it is almost a question of “fashion”. If a theme becomes fashionable, a whole lot of things benefit from it.

*Lord Taylor of Gryfe*

2158. Sir William, I agree with all that you are saying. Where I get some difficulty is in the kind of instrument for doing this. You are familiar with MITI in Japan and with the state supported, Länder supported, activities of government in Germany. We in our political history have had various devices like enterprise boards and so on. We have never quite been able in Britain to have the right balance of government intervention and industry. If one looks at these other countries and at their experience have you any advice to offer on how you see the structure of government intervention—intervention is perhaps too strong a word—at least, of government agreement to a general strategy supportive of manufacturing industry incorporating not only industry but the education system, the universities, the whole shebang, so that there is a climate of change supported by education, financial assistance, fiscal incentives? We have never been able to get the structure right, and the whole thing has been bogged

down by an ideological debate too. I wondered whether you with your experience had any comment on the general structure?

A. I do not want to be unhelpful, but I do not think that I can. I am not equipped this afternoon to give you a structure, but it has got to start with the will to do the things that you have just so accurately described, Lord Taylor. Government has a key role to play. The Government does not wish to play that role. I have talked to each Secretary of State for Trade and Industry one after the other on this very subject. I have sometimes felt recently that there was a glimmer of interest, but before anything is done he is gone and the Minister of State who has been with him has gone, and we have just seen it again recently. It makes it very difficult.

*Lord Gregson*

2159. I spent last Friday at our old college, UMIST, having a look at their research programme. You are probably aware that they have been extremely successful in increasing their industrial contribution to research. I was horrified to find that nearly 90 per cent of their industrial sponsors were foreign and just over 10 per cent were UK companies, one of which, I might hasten to say, was BICC, but it stood out as such a lonely name on the list that my eyes were immediately drawn to it. The other thing they told me was that no companies, foreign or British, really wanted to join collaborative LINK programmes because they felt it was a waste of their money and they would much rather devote their money to one-to-one projects where there is an ultimate product. Does that surprise you?

A. The one about foreign does not surprise me. One of the questions you said we would talk about is short termism. We are taking a very short-term view about the ownership of companies operating in this country. We have recently seen the sale of ICL to the Japanese, STC to the Canadians and RHP to the Japanese. Those are example sales of companies with foreign owners. None of those should have been allowed to happen in strategic industries. As inward investment is approved by the Government, more and more foreign companies are being encouraged to come and invest here and use British labour and British talent. Unfortunately, however, the strategy of the company is always controlled elsewhere and the R&D spend investment and programme is controlled elsewhere. If it pays them to have things done here, they will have them done. They clearly think that UMIST is good so they will be happy to have programmes done there. It is sad and in the long-term thoroughly bad for the country that increasingly strategic industries are passing into foreign hands. Another one with which I was concerned was Inmos which was sold to the French. I have spent a large part of my working life developing companies which would be British companies in an important scene like computers, ball bearings and chips only to see later, because



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SIR WILLIAM BARLOW

[Continued

[Lord Gregson *Contd*]

people have not had the patience to stay, them being sold off to a foreign company that sees some merit in them.

2160. Do you agree that the collaborative programmes like LINK are not popular among industrialists?

A. It depends at what level. My company does take part in quite a number of the EC collaborative programmes at the basic technology level. When it gets to more detailed work we would want to go our own way as we can perhaps invent a better mouse trap than our competitors, but in some areas we do collaborative work with competitors. An example is superconductivity. Because it is long-term and expensive we are happy to work with competitors. Referring back to collaborative ventures in universities, the LINK programme is unsatisfactory because it is loaded against industry and has never been popular for that reason.

*Chairman*

2161. Loaded against industry in what sense?

A. Any money put in by industry is additional and any money put in from the government side is instead of what was spent on other programmes. It has been a failure.

2162. Your point about the sale of British companies to foreign companies I think leads on naturally to the problem of short termism, which has come up in many of our meetings and which has become recently a very popular topic with the Department of Trade and Industry and Innovation Advisory Board, who have highlighted the problem of short termism. Would you like to say something about that particularly as regards its effect on investment in innovation?

A. Yes, my Lord Chairman. I do not share the view of some people that short term expectations on the stock market for results in themselves limit investment in R&D and new capital equipment. Good companies do make profits and generate cash and those companies will then invest and will not be put off by something that is happening six months, or 12 months ahead, unlike, if I may say so, the Government, who think nothing about changing an investment programme that has been agreed six months later. This is what has happened to the railways, for example. I am not in the school that says because I as a company chairman am expected to announce a better result every six months we are not going to do anything long-term. We take the view and a lot of good companies do—that if we do not do things long-term we will not achieve success; but we remember that we have got to make profits. A form of short termism that does affect us is the constant looking over our shoulder wondering whether we will be the next to be the subject of a takeover by a financial conglomerate which sees us as a split-up proposition or, indeed, by a foreign company. It is a constant concern which I think all of us have, on the one hand the possibility of being

bought to be split up by financial conglomerates; or the fact that we will fit nicely into some large foreign company's portfolio because they are not well represented here. The view that has come from some people in the CBI that it is the need to make more profit every six months which prevents investment is one I have never shared. Incidentally, there is a very good booklet written by Professor Paul Marsh of the London Business School which was published only last week. I have read it over the weekend. I think it is an excellent riposte to that sort of theme. Also, when the CBI had its special committee on this it came round to the view that the case was not proven.

*Lord Gregson*

2163. Does not the fact that that booklet was paid for lock, stock and barrel very handsomely by the people who are defending the City position raise a little doubt in your mind?

A. Not with Professor Marsh. I have known Professor Marsh for years. As deputy chairman of governors of the London Business School I have seen him professionally. He strikes me as one of the last people to be so influenced.

*Chairman*

2164. If I may pursue your point about takeover threat, is that not the problem, that if you do not make higher profits each year, for instance, because you spent a lot more money on product development in one year your profits, having written off the R&D, are less next year, and does that not make you more of a target for takeover and therefore make management reluctant to spend that money? Is that not the point?

A. Yes, but it does not often come to that, my Lord Chairman. It does not often come to the point where you are going to finance an innovation project or research project to the extent that it is going to reduce profits. The scales are usually different.

2165. Not in your company, but in small ones?

A. It is a good company that spends 10 or 12 per cent on R&D.

*Lord Gregson*

2166. Our competitors spend 10 and 12 per cent on R&D. It is an exceptional company in this country that does.

A. It depends what sort of thing you are in. If you are in communications and electronics it is not uncommon to spend such amounts. Your specific questions are related to what is preventing innovation. I do not think that this short-term theme really is.

2167. Does the fact that British companies pay three times the unit of dividend per unit of profit compared with our competitors worry you? In other words, the shareholders extract three times the

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SIR WILLIAM BARLOW

[Continued]

[Lord Gregson *Contd*]

dividend from our companies that our competitors' shareholders extract from the companies in the competitors countries? Does that not worry you?

A. The shareholders' view on industrial investment in this country is in the range of 3 to 6 per cent. It is not very much. The building society pays 14 per cent.

2168. Slightly higher than that, Sir William, on the latest statistics.

A. Well, I do not know many good companies, Lord Gregson, in which you get a yield of more than 7 per cent.

2169. It is better than 3 per cent though, is it not?

A. I said in the range of 3 to 6 per cent.

Lord Gregson] It is more at the top end than the bottom end.

*Lord Taylor of Gryfe*

2170. I was going to ask whether the situation worries Sir William. He has been talking about successful companies in which he has been involved. I read the FT every day and see company profits falling rapidly. Every time the chairman invariably says that the profits have fallen from £30 to £22 million "but we have decided to maintain the dividend". The dividend is being maintained at the expense of some other element in the costing of the company. R&D is a soft option, reserves too. Does this situation worry you?

A. This trend you are reading in the Financial Times is a trend of the last three months. It is a new trend since you started your Committee. If it goes on and on and gets worse it then is going to affect companies in all their activities, but the situation you have just described has arisen from this recession, which we have gone into rather quickly.

2171. Can I suggest that if you look at the statistics carefully over the last five years one interesting thing is that dividends have increased faster than profit; even though profit has increased fairly well time and time again profits have increased 10 per cent and the dividend has increased by 20 per cent. That is not a recent phenomenon.

A. I should not have thought that to be the case. Usually the complaint is the other way round: the profits have gone up—which promotes the question: when are we shareholders going to have a corresponding increase in dividend? All companies with which I have been associated with has received that complaint. Getting the finance director to agree to increase the dividend is usually difficult because he would much rather keep it with the thought, "We can do better with it than to hand it out to shareholders".

*Chairman*

2172. Your company is strong and pretty big and has not got behindhand, but supposing that a company has got behindhand in its product

development and sees its main product disappearing in obsolescence in a year or two's time? When we were Germany we were told on two occasions—once by a bank and once by a company—that if a company in Germany got into that position it would be quite acceptable for them to say: we want all the money we can get to put into the product development and we will pass our dividend this year and put all the money we would have paid into dividend into product development and R&D. I think it is true to say that that would be almost inconceivable in this country, would it not?

A. Yes, and even in Germany, I would want to know how they were going to spend so much money. Anyway, to answer the question, yes, it is inconceivable in this country.

*Lord Taylor of Gryfe*

2173. Like Sir William, I was reading books at the weekend and came across a new book, "Friends in High Places" or, "Who runs Britain", by Jeremy Paxman. He deals with this question of the Pilkington takeover, the threatened takeover, in which Pilkington had spent a good deal of money on R&D suddenly became vulnerable. The predator, Owen Green, said: "We have never seen the ethical need or material need for placing research and development in the forefront of our activities. Research does not seem to fit easily into the cut and thrust environment of industry and commerce". Owen Green is a very formidable figure. If that is his philosophy is this not a basic weakness and a threat to innovation?

A. I am surprised he said that, but it would not be my philosophy. You are quoting one chairman. That is his philosophy. It is certainly not mine. I do not think it is the philosophy that is followed by most good companies who depend for their success on technology.

*Lord Erroll of Hale*

2174. I was just thinking, in the case of dividend increases and comparing this with profit increases, that a great deal depends on how much the dividend actually costs. So often—this has been my experience—the cost of the dividend is a very small proportion of the total profit. You can double your dividend and still have a large slice of retained profit, which the finance director holds on to for financing R&D and expansion within the company. I offer that as a view and should like to know whether you agree with it?

A. In most engineering companies I think the dividend is a fair proportion of profit. On retentions one would normally like a dividend cover of at least two, which presupposes therefore that the dividend is one third of the profit. Most boards would not contemplate doubling the dividend. It depends on the type of company. The manufacturing company that your Committee is considering I would normally make the dividend is quite a fair proportion of the profit. But I come back to the point that those who provide the capital need a



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[Continued]

[Lord Erroll of Hale *Contd*]

return on it, otherwise they will not provide any more. I have to say, my Lord Chairman, that when you need capital for some good plan in a company that has a good record it is possible to get the finance from increased borrowing or a rights issue.

*Chairman*

2175. May we turn to another aspect, the marketing side. I think you would agree that one of the prime objectives of most Japanese manufacturing companies is to increase their market share and they will do it almost at any price to start with. Having obtained their substantial dominating share, they then make a lot of money on it by putting prices up, getting volume production and reducing costs. Do you think on the whole our manufacturing companies know enough about their competitors' business and have enough evidence about marketing in that sense so that they can find out how to get a bigger share of the world market in their field?

A. Quite a number of British companies know all too little about their world-wide competitors. The gathering of intelligence about competitors I consider to be an essential thing to do, which in itself then produces the stimulus to get cracking and do something. In this country I do find very often that people are surprisingly unknowing about how far their competitors have gone. This question of the Japanese going for market share first and foremost is again related to their view about what is an acceptable profit. Japanese companies typically are financed by bank money where the rate of interest is very much less than we pay. They have a very small equity base. Much of that is held by the banks, who do not seem to worry too much about dividends. Therefore, they can afford to penetrate markets perhaps without making profits in a way that it is difficult for us to do. But your question was: do companies know enough. I think most companies try hard enough to find out.

*Lord Gregson*

2176. It is well known that Japanese embassies throughout the world have a very efficient information gathering organisation. Probably half their staff are concerned through MITI in gathering industrial information and R&D information. Would it not be a possibility for the United Kingdom Government to take a leaf out of their book and turn some of their embassy activities towards that direction of gathering competitive information for British industry?

A. I do not really know. You would have to have different people in the embassies.

2177. The Japanese have different people. They are staffed by engineers mostly.

A. We do not have that, so it would mean a change in the diplomatic service. But in Japan, you know, we have had some pretty switched on—I forget the exact title.

2178. Science and technology counsellors.

A. Yes, provided by industry. I remember Dr Marshall from Plessey sending despatches back here, distributed by the DTI, which actually caused quite a lot of ripples.

2179. But those officers are now being cut back as part of the economy drive.

A. Are they?

2180. Do you think that that is a sensible thing to do?

A. No, I think they were very useful. I was not aware that they had been cut back.

Chairman] Sir William, thank you very much for coming and helping us today. We are most grateful to you for spending the time with us.

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[Continued

## Examination of Witness

SIR JOHN HARVEY-JONES, called in and examined.

*Chairman*

2181. Sir John, thank you very much for giving your time to come and help us.

(*Sir John Harvey-Jones*) Thank you for the invitation, my Lord Chairman.

2182. I think you know the sort of thing we want to talk about and you know generally our line. Let us start off with the general question, what do you feel are the principal obstacles or discouragement to greater investment in innovation in manufacturing industry in order to increase its share of world trade?

A. I think that there are a number. The difficulty with giving evidence on this, Sir, is that a number of them are in the mind rather than necessarily realities. I have been reading over the weekend Professor Paul Marsh, who proves conclusively to his satisfaction that there is no such thing as short termism; I am bound to tell you that he did not prove that to me.

*Lord Gregson*

2183. Hear, hear!

A. But there is a broadly held view, I believe, certainly among a large group of industry and certainly among a substantial number of small and middle sized companies that a continual increase in the dividend and, indeed, the maintenance of the dividend—and I have some experience of the punishment that is meted out if you reduce it—is a prime consideration if you are still to command capital markets. I think that there are other factors. Many of them of course are well known, particularly to your Lordships. There is generally speaking, I believe, a lack of strategical thinking in British business. Innovation—and I know that you have received an excellent paper by Mr Melpus, which he presented to the research society, which showed that the pay-off from genuine innovation is very frequently in the second or third investment in that area. I think that this is a very important area of thinking. I believe that his case is a sound one. The difficulty is that all too few of us are pursuing over that sort of time scale a consistent policy. I heard you ask my distinguished predecessor some questions about the Japanese approach to this. Whether it is because of financial criteria or because of the nature of the beast, the Japanese tend to have a very consistent, very determined, very clear long-term aim for their businesses. In my experience that is a relatively rare phenomenon to discover in British business; it is very rare to find it in the small and medium sized businesses. I think there are other factors as well. Your Lordships and many others have already remarked on the general disregard for engineering in our country, and in particular development engineering and production engineering. In all my experience in industry they have been ill-regarded skills. There is not an absolute rule, but a near invariable rule, that if invention costs one—and actually we in Britain are still quite good at invention—development costs ten, bringing to the

market costs one hundred and you need a market of one thousand units to repay that. Again I think that those numbers themselves tend to destroy the small and medium sized company. First of all they do not have the length of time horizon. In many cases they do not have the aspiration. I have had some recent rather well publicised experience with small companies, and the depressing thing about the smaller companies is that they reach a comfort factor at a depressingly low level of international competitiveness. If I compare them with the German medium sized companies I know, the *mittelstand*, there is a world of difference between the levels at which our own small and medium sized companies appear to be satisfied and believe that they are safe and the aspirations of companies of that size in other countries.

*Chairman*

2184. Why is that, do you think? Is it just history, ethos?

A. There is a lot of history, I think; there is a certain amount of ethos. I think there is something to do actually with family firms, and I am not knocking family firms, but many of our smaller businesses have been built up by original entrepreneurs and I think that they are too easily satisfied with being the biggest in Bakewell, the biggest in Derbyshire and then the biggest in the north of England. That size of company has, habitually tended to be satisfied with the UK market as its home, and it takes a pretty aggressive and ambitious company to try to dominate even the UK market. Where they have sought to penetrate external markets they have ridden on the back of what were the commanding heights of our economy. Sadly, there are all too few of them. Whenever Mercedes exports a car I do not need to point out to you that it exports the products of one thousand *mittelstand* companies and at the present moment at my latest count—although you, Sir, would know better than I do—at best three British companies. Now we have lost many of these commanding heights.

*Lord Taylor of Gryfe*

2185. Some of us went to Germany to look at this support for smaller and medium sized companies, Sir John. We were much impressed by the fact that the support and encouragement was substantially decentralised, that the Government was not “someone way up in Whitehall” to whom you pled your case for assistance, but it was intimate, it was local, there was a Max-Planck institute or some other research institute available, and the universities and the schools were all part of an integrated whole in stimulating their success. How do you see the structure of this country which would change the mood and make it more successful and more on the German model? The Government has not always been very good at intervening. Is our structure different as well as our ethos?



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SIR JOHN HARVEY-JONES

[Continued

[Lord Taylor of Gryfe Contd]

A. Our structure is totally different, Sir, as you know, and our values are totally different. I do not speak with any bitterness, but management is not looked upon as a highly desirable British skill. Moreover, there are gulfs which are actually being lessened quite significantly between the world of academia and the world of management. There is very little mobility between these areas in Britain by comparison with either Germany or America. It is totally unusual for a businessman to have a successful transition into a university and, indeed, he would have to be pretty stupid to try to do it because the rewards of the two are somewhat incommensurate. It is even more unusual to find a successful academic pursuing a successful career in industry. I believe I have to say sadly that our attitudes to this problem are very deep rooted. I am not sure what one can do structurally to change them. I think that some of the things that are happening now, which are actually happening by accident rather than by design, are helping this process. There are many more of us who are now involved in the university world. I spend a proportion of my time in it. Many more university chancellors are now from business and industry and more or less *faute de mieux* business and industry are being called into the field of academia, and academia is getting to accept that it needs this sort of help. However, having had a little bit of experience of trying to move from one area to another, I can say that there is something less than total regard on the part of academics for the rather more prosaic and dirty-booted skills that industrialists have.

Lord Gregson

2186. You say that the thing is gradually changing. Is it changing fast enough?

A. No, Sir.

2187. Is it changing fast enough to save us from a horrible fate?

A. No, Sir, the country is not changing fast enough, industry is not changing fast enough and in these particular areas we are miles behind. If I wanted to single out one point of difference between ourselves and our major competitors in the rest of the world—and I think primarily here of Germany and Japan, but the States would also still qualify in this respect—the standards of actual training, experience and knowledge of management in those three countries—and I look round your distinguished Committee and I know how many of you recognise this—are miles apart. The biggest shock I had when visiting smaller companies was, first of all, how few of them had any management training at all; and secondly, how few of them were taking a long sighted view of the future of the company. If you do not have some regard for those two factors I have to say, one can blame the City of London, but I do not think that that is a prime point of impact. I do not think the City of London helps; or, at least, having read Paul Marsh, I do not think that the perception of the City of London helps. You

can prove over and over again—and the trouble is that we get into a sterile sort of blaming each other argument, and the City can frequently demonstrate that they raise money when it is needed and they can sometimes demonstrate that they do not punish companies who do not perform to their weird and archaic criteria, but the fact of the matter is that most of us do not believe that that is the way they work.

2188. If we are not making progress fast enough, what the hell do we do about it because the result of that is pretty horrible to contemplate in terms of the standard of living in the country?

A. I think that we have, and I have said this for many years, Lord Gregson, to put a different priority on industrial performance. I fear deeply. I think as a country we persuaded ourselves that the post-industrial revolution was going to be borne on the backs of selling knowledge. Sir William Barlow and I and many others round the table are trying to sell knowledge and we know the lousy price that you get for it. You never even get the price of developing the knowledge, let alone a return. The reality is that you sell your knowledge actually through your products. I believe fundamentally that our world is changing. I believe particularly with modern developments in production technology the game of the future—and, if I may say so, Sir, that is why I think this Committee is so vitally important—is going to be about design and leading the market in innovation and trying and bringing products to market immeasurably faster than they have been in the past.

Lord Kearton

2189. Exactly what the Japanese have realised!

A. Precisely, Sir. But, if I may say so, a behaviour pattern more remote from the majority of British industry is difficult to imagine.

2190. You mentioned Germany, Japan and France, all of which we have visited in one capacity or another in recent years, and we have seen their style. We went to Italy as well. It is very interesting that Italy is coming up in the same league.

A. Absolutely.

2191. It is really extraordinary. I used to work in Italy in the fifties and sixties. The thing that impressed me most on this recent visit was the sheer *joie de vivre* of industrialists. If I may say so, Sir John, you are almost unique among British industrialists in enjoying it and being cheerful about it.

A. Well, I am a pensioner, Sir!

2192. It is extraordinary, if I may say so, the number of people we see abroad with a great sense of their own importance in the scheme of things (I do not mean that in any pejorative sense), knowing their job is important for their country, and they feel



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SIR JOHN HARVEY-JONES

[Continued

[Lord Kearton *Contd*]

well regarded. We found the partnership between business and industry and to a certain extent finance is closer. When we went round some of the large firms like Fiat, and the smaller firms that are still family owned, we often found that the local university or polytechnic people were present, very much to show off how well their people were doing there. We went to Assolombarda, which corresponds to the CBI, and found three professors there. The thing that overwhelmingly struck us was that they enjoyed it. Now they have a lot of troubles. We talked to Olivetti yet, despite the news the other day, they expressed great confidence that they would get over their troubles and do something about it. That is the kind of self-confidence that abounds in Germany, Italy and in Japan, and more in France than there ever used to be.

A. That again is a relatively recent development. If one takes Lord Gregson's point, it seems to indicate that one can change a country's culture rather faster than we tend to accept.

2193. We have come over and over to the same thing—it is like saying motherhood is a good thing; we have got to change the culture of the country. Despite people like Sir William and you, on the government side the general ethos about business in this country is still minimal. Your television programme in my view has done more than anything else that I can think of in the last year to make people aware of business.

A. I have had no discussion with Government of any sort on any industrial theme since I retired.

*Lord Gregson*

2194. Who is going to lead the revolution, Sir John?

A. A young man, Sir, like you!

2195. But it will not be the CBI, will it?

A. I have to say, Sir, that the CBI cannot lead such a revolution with the best will in the world. First of all, the CBI is a very broad church. Secondly, it is a distillation of a distillation. It is ultra pure and it tends—I am not being bitter and twisted in any way—by its very constitution and nature to move down to the lowest common denominator rather than reaching for the soaring heights. It has a habit of punishing its representatives who take the high ground, and has done in the past. I have again to say, Sir, that a part of this problem is, I think, the point that Lord Kearton made. It is up to us as industrialists to speak for industry. If we do not, I do not see who the hell else is going to. If I may again speak from bitter personal experience, the position of the industrialist who actually does speak up is not one where you are envied by your colleagues, rather, you are looked upon as a big mouth, and they may well be right, and you are far from being applauded by your colleagues; you tend to be denigrated. It is not being bitter and twisted; it is just a fact of the way that we are. I believe that a great many of our great leaders of industry deliberately seek to avoid

publicity and the high ground. I actually happen to think that that is denigrating their responsibility, but the difficulty is that if you do the opposite of this it is looked upon as an ego trip rather than as a service, as indeed are many of the attitudes to industry and industry's position in our country.

*Lord Flowers*

2196. If I may speak as an academic, Sir John, that is not unique to the managerial profession.

A. I have perceived the same problems, Sir!

Chairman] Do you think that management schools, in the longer term albeit, have a part to play in this to change the ethos of management and make people speak out and make them more conscious of the importance of manufacturing industry, growing the market share and the like?

Lord Taylor of Gryfe] And can you comment on the quality of management schools in this country, Sir John?

*Chairman*

2197. And their contribution?

A. I am a perennial optimist. I think that I see some real changes in the younger people, and again I bow to Lord Flowers and others who see more undergraduates than I do. My young undergraduates, I must say, are showing both more appreciation of the desirability of following a management career and more appreciation of the worthwhileness of so doing. That is a relatively recent change. Only five years ago they all wanted to be in the City and have a Porsche, and half the chemical engineers we were training in the country ended up in those pursuits, which they have recently given up following, of course.

*Lord Gregson*

2198. In all seriousness, Sir John, is it industry that ought to be leading this revolution? As industry shrinks, it gets more and more comfortable for those who are left in it. They have a bigger market, they have less competition and so on and so forth. It is the nation really that suffers in the end.

A. I think that that is a misreading of the situation.

2199. All right, but is it not the Prime Minister who ought to be standing up and shouting from the rooftops, "By God, industry better pull itself together and do this, that and the other"?

A. She has made that view known from time to time in her inimitable fashion. She has expressed her displeasure at the poor performance of industry. First of all, may I take up Lord Gregson's point: I do not think that life does get more comfortable as industry gets smaller; I think it gets a great deal more difficult. You have undoubtedly read Michael Porter's book, "The Competitive Advantage of Nations". That shows abundantly clearly that what you need is a critical mass of industry competing hard with themselves. Frankly, the worst situation



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[Continued

[Lord Gregson *Contd*]

you can be in is to be a sole, monopolistic supplier in an enclosed market that is about to be attacked by everybody in the world. I do not think that life is more comfortable. I think it is the reverse: it is more dangerous. I believe that a lot of our responsibility lies at the hands of our managers. I heard you ask Sir William Barlow earlier his views on British management. I have to say that my experience of British management is that it is under-trained, it is under-professional, it is damned hard working and well intentioned, but it is not recruited from the brightest and best in our country by the wildest stretch of the imagination.

*Lord Butterworth*

2200. Are you saying then that British manufacturing industry does not really get its fair share of the ablest?

A.I am absolutely sure that is right, Sir.

2201. Why is it that a fair proportion of the ablest is not attracted into industry?

A.It is partly the image of industry, it is partly the social perceived social worth of industry. It is perhaps a denigration, but I was talking to the Bradford University industrial society the other day, and there were 300 of them. Bradford is a technological university and the industrial society is pretty good. I heard the words coming out of my mouth that I would offer a bottle of champagne to any one of them who could name two of the chairmen of any of the top ten British companies. As I heard the words coming out of my mouth, I thought, I had better go and place a bulk order. In the event I had to hand out one bottle of champagne. Now, there are not industrial heroes in this country. But you try that, if I may say so, in Germany or Japan.

2202. Why is it that the medical profession is overstocked with able people, if I may put it that way? Is it because they are paid better?

A.No, certainly not. It always amazes me. As you well know, the medical profession comes top in every survey of university graduates as the profession that they most admire. In the most recent survey that I have seen—you may have seen some more recent—to my horror lawyers came number two, but to my absolute relief managers came number three. It was the first time that they have ever appeared. But, all of that said, engineers came second from bottom.

2203. I am sorry to press you on this, but is the experience of Germany and the States so different because their engineers enjoy social standing in the community and respect, they are trained to doctoral level and so on?

A.I think that there is a whole variety of reasons, Sir, some of which may seem trivial. First of all, there is no question that the engineer historically has been given a regard both in academia and in civilian life—I mean, every man you meet in Germany

always introduces himself by his full title and every man you meet in the States introduces himself by his name and the firm for which he works. In Britain by and large people try and conceal the fact that they work in industry rather than be proud of it. Indeed, a branch of my family—but perhaps I had better leave this.

*Chairman*

2204. No, go on!

A.My family is an army family, Sir. They insisted on introducing me—and after I had had, I thought, a pretty distinguished industrial career—as “Lieutenant Commander Harvey-Jones”. I remember saying to my aunt on one occasion, “Why don’t you introduce me now as Mr Harvey-Jones”, and she went and discussed the matter with my uncle, a retired army officer of moderate eminence, and came back very embarrassedly and said, “We’d much rather not, we have to live here”! These things are very deep seated, they really are! Only in Britain is an engineer viewed as being a mechanic. If you say you are an engineer, it is assumed that you are a member of the Amalgamated Engineering Union.

*Lord Flowers*

2205. Perhaps I may change the subject. You talked about Paul Marsh and said you did not find his views entirely acceptable or convincing to you. We have had him thrown at us rather hard lately and I dare say he will be thrown at us even harder in future now that his report is out. I wonder whether you could amplify why you found him unsatisfactory?

A.I have to say that I find this difficult to answer because I received the book on Friday only and, of course, I start off with prejudices in this, which I fully recognise. The main difficulty, I think, is that Professor Marsh falls into the usual trap of assuming that if you can prove something in some sort of statistical way that is itself a fact. The reality is that the reactions of people are their perceptions of facts. I have not had time to analyse the book—in my dotage I still do a ridiculous number of things—but I read it through. For example, I tend to take the view that Sir William takes about the differential cost of capital in Britain and in Japan. Interestingly enough, so do the Japanese to whom I have spoken and with whom I have worked. They take the view that with 5 per cent return in Japan you are a hero, and if you want to penetrate the Japanese market and are prepared to ask for a sacrificial return of, say, 10 per cent you are being greedy and will never make it. Now Paul Marsh demonstrates by some mathematics that I am still endeavouring to unravel to my satisfaction that the differential cost of capital as between Britain and Japan is 1 per cent. I am not in a position to argue—and would not on principle—with a professor from the London Business School on a matter of statistical data, but even if that were true it is not the perception. The perception of us all is the trigger point for actions that we take. Now what worries me about the report is that it was

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[Continued]

[Lord Flowers *Contd*]

sent to me on Friday, as I say, with a covering note saying, "We have been proved clear, it has got nothing to do with it, it is all *your* fault, you stupid oafs of managers. We need more dialogue". Well, a dialogue between two sides who say it has got nothing to do with them is not likely to solve this problem. It seems to me—and I genuinely believe—that we have a high differential rate of capital in this country by comparison with our main competitors. I am convinced of the arguments that are very largely related to equity rates, but the reality, as we all know, is that the amount of capital that we can seek to raise on equity, particularly for a large company, is relatively small in this country. What matters in fact is the all-up interest rate. Of course, I accept that from that, you have to deduct inflation. No matter how you look at it we are running in a different hurdle race. Our perception, I believe, despite Sir William's glowing words, has been and still is in most of the companies I am in that we should be aiming to increase the dividends. I buy entirely the point, of course, that we have to maintain an acceptable dividend covered. I also buy very strongly the point that if we went to the sort of gearing levels that occur in Japan or Germany we simply would be marked down at a rate of knots in this country. Therefore, I find the arguments about the perfectness of the equity market, if I may say so, unrelated to the phenomenon that he claims to have disproved.

2206. When you have read the book, Sir John—and I cannot believe that you have not after all that—if you would care to write a book review we might publish it for you.

A.Thank you, I will certainly bear that in mind.

*Chairman*

2207. Are you saying, Sir John, that the threat of takeover to which Sir William referred is an important one, that it is a relevant one?

A.It is very much so in the minds of people. I think that we would be foolish—who am I to say this to you, Sir—to major on this. I believe, in fact, that the threat of takeover has somewhat receded. I think that was a particularly unfortunate phase. I have certainly got personal experience of companies—and I would not wish to name them here—who have been very highly concerned at the threat of takeover, companies of a size that in any other country you would have thought would have been totally impervious to such threats. Now whether or not in those cases we were frightening ourselves with chimera I cannot judge. What I can judge is that we believe that there was a real threat of takeover. I think that it is absolutely, abundantly clear that there is a dual market and that the takeover market will still value even a well managed company at a higher price than its earning capacity. Now Professor Marsh—and I would not in fact wish to spend my whole afternoon discussing Professor Marsh from the bits of him that I have read—claims, and I have had the same argument with Sir James

Goldsmith and others publicly and privately, to show – there is this convenient argument – that a well managed company is not threatened by takeover. I frankly find that totally unproven. I find it abundantly clear that a badly managed company is subject to takeover, I have no problem with that. I actually do not have too much problem with maybe that they should be although I would prefer to see the different ways of restructuring industry which are employed in Japan and Germany, which I believe to be less painful and less deleterious to the amounts of money that we have deployed in industry because there is no winner in a takeover, not in an industrial sense. There may be winners in a shareholder sense but there are no winners in an industrial sense. I think that there is no evidence. I have been lucky enough to work in well managed companies, and I can think of well managed companies. I do not think at the stage at which the Kuwait Investment Office took their holding in BP they would have argued that BP was a badly managed company. It did not save them. I do not think at the stage at which they took their holding in Hoechst in Germany you would have argued that Hoechst was a badly managed company. The difference was, of course, that had it not been for special government intervention they could have continued to move against BP; there was no way in which they could have continued to move against Hoechst.

*Lord Gregson*

2208. Do we not also have the suggestion of the level playing field? The stock articles of association in Germany contain a clause that says that no one shareholder shall vote more than 50 per cent of the shares, which means that it is quite impossible?

A.In practical terms, Lord Gregson, as you well know, it is impossible to take over a company in Germany in a contested bid. It is impossible to take over a company in Switzerland in a contested bid. It is very nearly impossible to take one over in Holland, it is impossible to take one over in Norway and it is very difficult in France where they have different ways of doing things. It is also extraordinarily difficult to take one over in Italy if you do not happen to be an Italian.

2209. And nobody knows how to do it in Japan.

A.In Japan you only get what they want to give you. If nobody in Japan wants it you may have a chance to commit hari kari or kamikazi or something and buy it.

*Chairman*

2210. If one leaves aside the question of high interest rates, what would you like to see done to deal with this so-called short termism problem?

A.I think that there are some things that you can do on short termism. A number of efforts have been made to suggest variable capital gains taxes on the amount of time that you hold stock. I must confess



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[Chairman *Contd*]

that for other reasons I would be rather keen to see a level playing field between private investment and pension fund and institutional investment. We are miles away from having an open playing field. I think it is totally illusory to think that we are going to be able, by the activities of the common market or anything else, to open up the German market. I do not see what form of legislation you can produce which will mean that the Frankfurt stock exchange controls more than, say, 500 companies—well, in fact, it only has 500 quoted companies still. I do not see anything that is going to change the fact that over 70 per cent of the shares of those 500 companies is actually controlled by five banks. It is illusory to think that starting from where we are we can get a level playing field in that way. Again I accept that the statistical evidence is that this has not harmed us too much at the present time, but we are honestly the only jungle in which predators from the continent can happily roam unhindered by anyone.

2211. Would you like to see it made more difficult?

A.I believe that there is a case for making it more difficult although I do not believe for a moment that we will ever make a level playing field. I think that there are other things, to get back to the major theme of innovation. I think that until recently there was clear evidence that although we were spending about the same amount of money on R&D—Lord Kearton and others produced numbers, and I do not presume to lecture them—the total amount of money we spend on R&D being roughly comparable to some of our major world competitors, the proportion that went into defence was totally disproportionate and, because of the way in which we organised that research, I believe, and because of the uniqueness of the defence establishment, we have been singularly unsuccessful in getting spin-off from that money which has been spent by the state into comparable industrial gain. I think that we should maintain the same level of national investment, but it needs to be redirected. I believe very strongly, I must say, that if the Japanese find it necessary to allow tax reduction for R&D for the life of me I cannot see how we hope on a penny farthing bicycle to compete on an unlevel playing field in that direction; and I cannot see why that should not be viewed as being a sensible intervention on the part of government. There are things like that which can be done. However, I still believe that basically—the point your Lordships were on earlier—this is an attitudinal problem as much as anything else, a value problem, an attitudinal problem, and I think a straight managerial professionalism problem.

2212. To take your point about allowing for tax on R&D, that in a sense is written off in the year in which it is incurred. Are you thinking of something more than that?

A.Well, I think that if you have a duty it should be allowed to roll over any period you want.

Lord Gregson

2213. The Japanese have tax credit, of course?  
A.Yes.

Lord Kearton

2214. Sir William mentioned that he felt some unease that a number of our major strategic companies have been taken over by foreign companies.

A.Or disappeared.

2215. When we investigated the Japanese relationship with Europe and this country last year we came to the somewhat melancholy conclusion that one of the better hopes for putting our balance of payments right was to encourage more Japanese inward investment. In fact, the amount of our manufacturing industry already owned by foreign companies is between 20 and 25 per cent. Mr Healey made a forecast the other day that by the middle of this decade it would rise to 40 per cent. Now it is a very good thing that big companies invest in each other's countries. But do you think this process of foreign ownership of British manufacturing industry is going too far?

A.The difficulty is, Lord Kearton, that rather than have British manufacturing industry disappear I would prefer that it changes ownership and survives.

2216. That was our conclusion.

A.But there is massive evidence that the areas where the competition of the future will occur are not in production. People fail to realise that the whole technology has changed. Again I apologise for talking in simple terms to people who know better than I do, particularly the Chairman. There is absolutely no reason why my robot should be any less effective than a Japanese or Korean robot; the damned thing works 24 hours a day in the dark anyway! The competition is not about servicing robots; the competition is about design, innovation, which is the subject you are looking at, creativity, designing and delivering into the market, distribution and so on. That is actually, I believe, what the post industrial revolution is about. The whole cost structure of industry has totally changed. If you want a visible sign of this on one day go and visit the Nissan plant at Washington, excellent though it is, and fly over and visit BMW. BMW have five brand new, large, integrated, massive halls full of design engineers and every sort of creative brain worker you could think of. Where are they at Washington? They are sitting back in Japan.

2217. One of the things that we said as a rider to the report was that it was very important, if we let these people come in, that they should bring the design strength with them, otherwise we would become just a colonial economy.

A.I have not got much confidence—the evidence so far is that it is difficult to insist that people when they produce a manufacturing satellite will produce

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[Continued]

[Lord Kearton *Contd*]

a technical service office, in my terms. They made, I do not know, produce a section of some damned thing, but the big battalions and the conceptual stuff by and large will be done back home where the country of origin is. A number of academic and other studies have shown that to be true.

2218. What worried us—though perhaps not worried, rather, what we noticed is that if you take good, big, successful companies in this country who are of world class the trend now is for them to do a lot more of their investment overseas. The big companies with an international character of this kind will continue to flourish. If we regard the trade balance as important—people like Lord Gregson think it is very important—it is very significant that it will be much more in the hands of incoming companies rather than our own big native companies.

A. It may be—you have looked at the figures more accurately than I have. First, the relatively small number of companies in Britain that command fear in the minds of their world-wide competitors may be certainly less than 20. Most of those are maintaining their technological heart in Britain, and Britain is still not a bad place to maintain a technological heart because we still have good scientists, though not enough, and good engineers, and they are cheap.

2219. Yes, but so far. Glaxo announced the other day its enormous laboratory extension in Carolina.

A. And so did ICI. We have had a laboratory extension there and we have also had a laboratory extension in India. Nevertheless, there is no question where the technological heart of our business would be, and I guess that it would be a very long time before that moves as long as the company is centred here.

*Chairman*

2220. Sir John, your own industry—chemicals, pharmaceuticals—that whole field has been very successful as regards exporting more than it imports. Why do you think that is the case?

A. In the case of pharmaceuticals I have little doubt that it is basically because we had a good home market—although it was much derided and has now been vociferously attacked—because we had a secure home market. We had single buyers in the shape of the National Health Service who allowed—I know many people felt—an outrageously high return, a return that gave us the muscle to fund the research and development which in turn is the only way that you produce the innovation which is the only way you can actually have a world industry. I have little doubt that was the case where—and I think it was largely wittingly—a whole series of government actions or inactions possibly created conditions that enabled that particular industry to flourish.

2221. To have higher margins and enough to invest?

A. It had a secure British base with reasonable margins in but still needed to sell world wide to recoup the cost of development because the cost of development in the pharmaceutical industry is extraordinarily high. I think it is that plus the fact that you get back, I think, to Michael Porter's theories. We had a cluster of very good companies, we had good support. The universities again lined up behind those companies. We had a pharmaceutical centre of excellence, and still have. I wish I were as confident that we still have got that position in chemicals.

I am not sure that we still have. The reason for chemical pre-eminence again, I think, related very largely to the characteristics of the leading companies in this country and their very close linkage with universities and their total commitment to innovation. Every company I know in the chemical industry believes and every company in the pharmaceutical industry believes that the only basis for that business is innovation. Unless you keep on innovating you know you are dead. Therefore, you have a strategic imperative. It is all too easy in some other areas to believe that putting a little turn on the thing here or redesigning the sprocket next year will keep you ahead.

2222. In other words, understanding by management of the importance of innovation was clear in the chemical and pharmaceutical industries?

A. Yes.

2223. Why was it so clear there and not so clear, say, in chemical engineering?

A. I think partly because those businesses have been world wide for many years so the managements concerned normally measure themselves against the best in the world whereas for many years it was possible—we are back to the aspiration argument—to lead a good enough life, a just comfortable enough life.

2224. Sheltered perhaps by Commonwealth manpower?

A. Oh, very much so.

*Lord Gregson*

2225. If you strip out pharmaceuticals from the rest of the chemical industry, the chemical industry shows a rather disappointing continuing performance?

A. That is why I said I think that we may well be seeing a change.

2226. The balance of payments is rapidly reducing so you cannot really say the same thing of the chemical industry that you can say about the pharmaceutical industry?

A. There are other reasons. I do not want to get into a whingeing mood, and I certainly do not want



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[Continued

[Lord Gregson *Contd*]

to be a spokesman for an industry that I left four years ago, for which I am not in any way a spokesman, but the level at which you set your exchange rate has a not inconsiderable bearing on what sort of business you can sustain. If you choose to set an exchange rate which overvalues your currency by a significant amount for other reasons by definition if you overvalue by 15 per cent you will have a hell of a job running a business in this country where the margin is 15 per cent. You can be as efficient as you like, but the reality is that you are deciding artificially that your country is going to have a particular sort of industrial background. I find this argument a very worrying one. It is always quoted and claimed that a high exchange rate produces a virile economy and virile manufacturing. My experience has been the other way round: a high exchange rate follows virile manufacturing. People refer to Switzerland. It is not an accident when you look at Switzerland that the nature of the businesses that they have is very small, very high added value. But the Swiss do start with a few advantages. They have every mafioso's money in the world sitting in their banks. They have not had a war since 1183 or whatever, and they have alps and nice hotels and all sorts of other ways of managing their balance of trade. It is not an accident that you have a high valued Swiss currency. It is not an accident that the businesses you find there are things like pharmaceuticals with high added value which can actually make their way on a world basis. We however start with a basis where we have a somewhat antiquated, by and large rather inadequate capital invested industrial basis. I would never wish to denigrate those people who work in it, but by and large the people who work in it are not highly regarded in the scale of things in the United Kingdom. They are certainly not highly regarded in society terms in the press. We have a structured society where there is very little movement between different groups and at the same time we have an overvalued exchange rate. It does not seem to me to be a very happy recipe for the future!

*Lord Kearton*

2227. Sir John, the general impression that I have this afternoon is that you do not feel very sanguine about the prospects of this country for the next decade?

A.No, Sir, I do not. I feel intensely optimistic about the prospects for Europe, but I feel less sanguine about the prospects for this country playing the part that I believe it could play and should play in Europe.

2228. But innovation is only a part, although very important. What you are really arguing for repeatedly this afternoon, I think, and to a certain extent Sir William also, is a complete change of culture in the country. That is a very tall order. How can it be brought about? It cannot be brought about by a committee like this.

A.If I may say so, Sir, without wishing to flatter this Committee, I see around in this room practically everybody who has spoken out for industry that I can think of over the past 20 years. I would honourably absolve you from any charge in this. No; Government has got to do something in this. The only point I am trying to make is that I think that we have to do more for ourselves, but time is not on our side, I really do not believe that it is.

2229. But the Government has got to work with the grain, not against it as it has done for the last decade?

A.Yes.

*Lord Whaddon*

2230. The message that I get loud and clear is either that the wrong messages have been coming from industry to Government or that they have not been coming through strongly enough. How do you get the right messages through strongly to the Government—reform the CBI or what?

A.I am at a total loss to know how Government get their messages—in some weird, osmotic way, I suspect! I have taken the rather simplistic view for many years: I do not actually believe that successive governments have sought deliberately to make life difficult for industry. I do believe that there is an ignorance of absolutely abysmal proportions on the part of politicians and on the part of civil servants and some degree of ignorance on the part of the financial community as to the conditions that are needed for industry to thrive. I have therefore taken the view for many years that the Department of Trade and Industry should be one whose comments are needed on any form of legislation passed by Government. So many times one finds in this country, it seems to me, that successive governments have believed that it is their job to make the social choices and then the job of industry and industrialists to adapt to that. I am not one of those who believe that the country should be run for the benefit of industry. I accept totally that the democratic province of Government is to make choices on behalf of everybody. However, I should like those choices to be made on a basis of better knowledge. You have only to look at the number (I have lost count) of ministers of trade and industry that we have had in the last ten years. In many cases I have never even had time to shake their hands before they have left. If those are the people upon whom the Cabinet are relying for advice on the effects on the industrial base of ill-considered legislation of one sort or another, I am not surprised that we do from time to time shoot ourselves in the foot, sometimes in both feet. In Germany and in Japan legislation is always passed at least in the knowledge and perception of what effect it will have on their industrial competitiveness. That is a different thing. It is not asking for a free ride or for an industrial policy. It is just asking for a greater degree of perception and understanding.

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[Continued]

[Lord Whaddon *Contd*]

2231. But do you think that the signals from industry, for instance, from the CBI, are the right ones?

A. Sometimes they are, sometimes they are not. I do not think actually that communicating through loudhailers via the press is the best way of communicating. I do not think that the press are particularly knowledgeable about this. I notice with interest that almost any time any industrialist or the CBI says anything the verbs used are verbs like "whine" and "whinge". Even when you are actually trying to point out facts on problems that are occurring it is taken and reported in the press as whining and whingeing, that we have a bunch of industrialists for ever looking to be bailed out for their own follies. In my experience you spend a very large amount of time in trying to overcome ill-considered actions which people would not knowingly have done if they had been appraised of the potential consequences in advance. I buy the point therefore that we need better communications, but it takes two to tango and we need somebody who wants to listen as well as somebody who wants to transmit.

*Lord Erroll of Hale*

2232. We have really ignored a very important part of manufacturing industry, the food and drink industry. There is a certain scope for innovation, but surely in this balance of payments argument that has taken up a good deal of our time this afternoon we should remember that it makes a very important contribution to our balance of payments?

A. Our drink industry is second to none, Sir.

2233. Facetiousness apart, Sir John, I include —

A. I was not being facetious, Sir. It is a fact that three out of the five largest drink companies in the world are British and are based in Britain.

2234. The scope there for innovation is probably relatively limited but it does make its contribution to the balance of payments—or, indeed, the soft drinks industry. Schweppes is sold pretty well round the world. As to some of our food manufacturers, biscuits we may laugh at, but —

A. I would never laugh, no. It is a well run industry.

2235. And makes a real contribution to our balance of payments?

A. Yes, but, Sir, you do make an assumption that I should like slightly to quarrel with, if I may. The discussion has been, as I see it, on technological innovation, but innovation is broader than that. The

area where the food industry and the drinks industry have been outstandingly creative—an area I know that is close to your heart—is in the sphere of branding and marketing. There is just as much innovation in that and just as much investment as there is in inventing a new product or process. I happen to be the deputy chairman of Grand Metropolitan and I have some knowledge of what we spend in that area. I also know what we spend on innovation in the terms that we discussed today. I am not in the business of advertising, but there is a product called Bailey's Irish Cream that did not exist 14 years ago; it is an invented product that is now the largest selling liqueur in the world. That is a combination of reading your market, having absolute clarity as to where the business ought to be and very innovative and skilful branding and marketing on a world-wide basis. Therefore, I hope that in your deliberations you will certainly consider still the contribution that innovation can make across the piece.

*Chairman*

2236. Would you add investment in innovative manufacturing processes too?

A. Yes, Sir.

*Lord Taylor of Gryfe*

2237. May I pay due compliments to the drinks industry and its place in the world markets. We know of course that the industry was declining and only a contested takeover has stimulated a revival in the Scotch whisky industry. If that company had been fully protected as in Japan we would still be in a much declining industry.

A. I have no doubt, Sir, that that particular company deserved its fate.

2238. Absolutely.

A. Whether it deserved its fate in the way that it was delivered to it is another question! But I have no doubt of that. Indeed, I think that that company was a good example of the dangers where you have an extensive share of the market. You therefore neglect actually driving any particular part of that product. The company of which I am deputy chairman does a pretty good business with a range of only three whiskies which we sell world wide, and we sell the world's second largest selling whisky. The fact that we had a dozy Daniel for a competitor, therefore, did not necessarily mean that some others of us were not prepared to have a go.

Chairman] Sir John, thank you very much. We are most grateful to you.









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MINUTES OF EVIDENCE  
TAKEN BEFORE THE

SELECT COMMITTEE ON SCIENCE  
AND TECHNOLOGY

(SUB-COMMITTEE I)

Wednesday 28 November 1990

DEPARTMENT OF TRADE AND INDUSTRY

*Rt Hon Peter Lilley, MP, Dr R Coleman,  
Dr C Hicks and Mrs M Bloom*

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WEDNESDAY 28 NOVEMBER 1990

Present:

Caldecote, V. (Chairman)  
Clitheroe, L.  
Erroll of Hale, L.  
Flowers, L.

Platt of Writtle, B.  
Taylor of Gryfe, L.  
Whaddon, L.

### Examination of Witnesses

RT HON PETER LILLEY, a Member of the House of Commons, Secretary of State for Trade and Industry, examined, DR R COLEMAN, Chief Scientist and Engineer, D C HICKS, Head of Research and Technology Policy Division and MRS M BLOOM, Head of Research and Technology Policy Division, Branch I, Department of Trade and Industry, called in and examined.

#### *Chairman*

2239. Secretary of State, could we welcome you most warmly, and thank you very much in these very busy times for coming along to help us today. We are most grateful. Would you like to introduce your colleagues before we start on the questions?

(*Mr Lilley*) I believe you may have met them before. Dr Coleman, Dr Hicks and Mrs Bloom, I believe, have already given evidence to your Committee. I will read out a statement, if I may, to start the ball rolling. I welcome this inquiry because innovation in manufacturing is enormously important. The prime responsibility for innovation lies with manufacturing industry itself. Profits are both necessary to fund and as an incentive for research and development, and profits have grown substantially in recent years. Manufacturing profitability, for example, has nearly doubled over the past decade, and hence manufacturing industry in the last five years for which we have figures has increased by 50 per cent its funding of research and development. Your Lordships will be well aware Britain has been outstandingly successful in academic science and technology. Our scientists have won more Nobel Prizes than those of any other major country except the USA; we have won more than Germany, three times as many as France and 13 times as many as the Japanese. But until recently British companies have not been notably successful in exploiting its scientific talent and expertise. This failure is not due to any lack of funding by Government, we spend nearly £3 billion per annum on civil research and development, which is more relative to our gross domestic product than Japan and the United States. The problem seems to me to be the divorce between industry and the scientific community, and so I and the Government are looking at ways of bringing the scientific community and industry together. One way is proximity, simply getting industry together with and adjacent to scientific institutions through science parks, which can achieve good interaction between the science base and companies. There are now 39 science parks in the United Kingdom compared with only two in 1979, and I am hoping to encourage more around polytechnics and Government research establishments. We are increasingly focusing Government innovation support on getting better co-operation between universities and companies, and on support for smaller firms, and I see this as a key priority in my department. I know you wish to ask me later about the three new initiatives which I will launch early next year to

increase support of research and development and application of technology in small and medium-sized firms. I therefore just mention them at this stage as a further indication that the Government is committed to encouraging innovation and exploitation of science. At the other end of the spectrum, British companies are making good use of the opportunities for collaborative research and development under the Community funded programmes. These collaborations are particularly important in developing common standards which will improve the competitiveness of industry. Early next year I shall be holding a brain-storming session with industrialists and academics to explore additional ways of strengthening the links between industry and academia. I hope that a few key individuals from overseas in that sphere will also take part so we can draw on foreign experience and ideas. That is all I wish to say by way of introduction, but I hope that is helpful to the Sub-Committee.

2240. Thank you very much, Secretary of State. I think we are very pleased to hear what you are saying and all that is good—profits up and productivity up—but the fact is we still are not making enough, and we are really looking at innovation in manufacturing industry with a view to seeing how more innovative investment can contribute to greater output from industry, which we believe is extremely important. Could we start with the first question which we believe is fundamental: many witnesses we have had have expressed the view that manufacturing industry does not appear to be very high on the Government's list of priorities for the economy. Could you give us your view as to the role of manufacturing industry and how important you see it to the future prosperity of the United Kingdom?

(*Mr Lilley*) I certainly cannot imagine a healthy British economy without a vigorous and successful manufacturing sector, and I am not sure why anyone should believe that the Government does not attach the highest importance to a vigorous manufacturing sector. It is important both as a source of wealth creation and for exports and jobs. Certainly I give it the highest priority in my dealings with industry generally. I have visited something like 20 companies since I have become Secretary of State and, just looking through the list, 18 of those are manufacturing companies. It might be legitimate to criticise me and the Government for neglecting other sectors, but I am not sure about allegations that we

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[Continued]

[Chairman Contd]

are neglecting and attach little importance to manufacturing. What cannot be done is to measure the importance we attach to any sector by the level of financial subventions; that is not the best measure. We have to get the climate right for enterprise and business success, and that is what we are set about doing, and that is a question of getting the right environment in trade union law, taxation, deregulation and so on.

2241. When you say "vigorously", do you mean increased output from manufacturing industry?

(Mr Lilley) Indeed, and that is what we have seen.

2242. Well, output is not very much up on 1979, in fact it is almost stagnant, although productivity has gone up a lot.

(Mr Lilley) It is quite significantly up since 1979, whereas it fell under the previous government.

2243. It is not up nearly enough.

(Mr Lilley) We would all agree with that.

2244. I think the reason some people feel that Government is not wholly behind the highest priority for manufacturing industry is that when ministers have been questioned from time to time on this, they have seemed reluctant to say that manufacturing industry is of the very highest importance and increased output by manufacturing industry is of the very highest importance. But you are now giving that assurance?

(Mr Lilley) It is of the highest importance, yes.

Chairman] I think that is very encouraging.

*Lord Whaddon*

2245. I am pleased to hear this, Secretary of State, but I cannot help being perturbed by the dramatic deficit in the balance of trade of manufactured goods, which certainly does not speak well for British manufacturers.

(Mr Lilley) I do not think the balance of payments is an indication of the competitiveness or otherwise of British industry.

It is a reflection of the excess demand and inflationary pressures in an economy. If, in a country like ours, expenditure is £520bn and output is £500bn, you have a deficit of £20bn. It is as simple as that. That roughly was the position a year ago. If the growth of expenditure has slowed down and output continues to grow the deficit will diminish, and that does not tell you much about competitiveness, but tells you a lot about the inflationary pressures in the economy.

*Chairman*

2246. I think we would beg to differ on that point, Secretary of State. The fact is if the products that industry offers for sale were more competitive

they would sell more, there would be fewer imports coming in and more exports. I think competitiveness is very important in this issue of the balance of trade.

(Mr Lilley) It is surely possible for a highly competitive economy, if demand grows excessively fast, to have a balance of payments deficit.

2247. Excessive to what? Excessive to supply or goods available to buy?

(Mr Lilley) Indeed. If output may be growing at X per cent. but if demand grows at X plus 10 per cent. you will end up with a deficit.

2248. We need to increase output by 10 per cent. on your example?

(Mr Lilley) There is quite clearly a limit to the rate at which output can grow. What one should not do is allow demand to grow excessively. That we did over a period and that we are putting right now.

2249. I am sure we would all accept that. I think we regard our task as seeing what can be done to increase the amount of investment in innovation in industry in order to try and increase the output to close that gap which you describe. Perhaps we can go on, on the basis that it does not solve the problem by itself for the reasons you have given, but we all agree it is very important to increase the output of manufacturing industry, and more investment in innovation is a major contributory factor to that.

(Mr Lilley) I entirely agree.

*Baroness Platt of Writtle*

2250. This is anecdotal evidence, but I think all of us have had the experience of trying to buy a piece of machinery maybe domestic or otherwise in this country, and having to buy a foreign manufacturer's product. I have always backed the Better Made in Britain Campaign, which does not say you buy British just for the sake of it, but it should be Better Made in Britain in order to make it more competitive in the marketplace and that would actually mean we would not be buying foreign imports and that would reduce the balance of trade problem in the way you suggest.

(Mr Lilley) I agree. I also welcome the efforts of the Better Made in Britain Campaign, and recently awarded the prizes that they gave to companies who have been making in Britain goods previously made abroad.

*Chairman*

2251. Could we pass on to the next question. Government funding for civil R&D has declined in real terms, as indeed has DTI's spending in support of innovation in manufacturing industry. In view of what we have been saying, would you like to comment on that?

(Mr Lilley) The most valuable research and development is that which is funded, organised and



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[Continued]

[Chairman Contd]

undertaken by companies themselves. They best know the markets and they are driven more by the pressures of competition to put their research and development to good use. That is why profitability is the key, in our view, to the right and adequate level of research and development. It is up to Government more to deal with getting the climate right. As I said before, industry has been increasing quite substantially the amount of research and development it has funded, a 50 per cent. increase over five years. Our job should be to exploit, as far as Government is concerned, the research and development we are already funding, or see that it is properly exploited by industry. That is why I put so much emphasis on exploiting the work of the science base and getting industry to work more closely with universities, institutes and so on.

2252. We have to look, do we not, at the scale of support given by our competitor governments to their manufacturing industry. Do you think our support relative to that is adequate?

(Mr Lilley) Once you do look back you realise that it is not Government support which is the key. We spend more than the Japanese as a proportion of our gross domestic product on civil research and development, far more if you include defence research and development in it, and yet Japan has been conspicuously successful as an innovative country because its companies do it themselves, not primarily because they are funded by government.

2253. We had a very interesting exposition by someone from MITI who was explaining to us there was rather a lot of help given in the early days on developing a new product and yet they tailed off their support when they got it off the ground. With a lot of our products, machine tools and others, we have lost our markets. Is not some help needed to regain those markets which we used to have in the kind of way the Japanese do it through MITI and the Germans do it through various methods of support?

(Mr Lilley) I am sure that the Japanese Government does give some assistance in the way you have described, but I am not sure that there is any evidence that the predominant successes of Japanese industry have been funded in that way. If one looks back at the transistor, which was one of the bases of Japanese industrial growth, I seem to recall it was funded by a private Japanese retired corporal who had great difficulty getting any permission at all to change his money into foreign exchange to buy the permits from the American government, which spent a great deal of money developing the idea but failed to put it to any practical use. That is some evidence that private enterprise works where government intervention does not.

Lord Taylor of Gryfe

2254. On the amount of money spent on research and development in this country, you have just distinguished between the civil research and military research, but research whether military or civil consumes a lot of resources, human and otherwise. It does alarm me a little, our figure on defence research is about 45 per cent. of our total UK Government research budget. I think the comparable figures for Germany are 12 per cent. and for Japan it is something like 6 or 8 per cent. It does suggest in this country there is an undue emphasis in the allocation of resources to defence as against civilian research. The Japanese and Germans have been rather more successful than we have. The other point is, while I agree that we cannot support individual firms and experience tells us we are not very good at picking winners, the experience of Japan indicates that Japan has established a kind of general strategy involving government, industry and academics (the universities), in the direction in which the economy is likely to proceed and the areas in which they are likely to advance. This strategy is given the necessary backing to achieve these ends. When I look at the support which your Department gives to industry it covers a great range of various forms of support and subsidy. I feel that compared to the Japanese experience we are not really hitting the target successfully as they have done. Is that fair comment, or not?

(Mr Lilley) I am not enough of an expert on Japanese experience to confirm or deny that, but I have great suspicions about most explanations of what happens in Japan. I am planning a visit there early next year. It seems to me the Japanese have been very successful across a broad swathe of manufacturing. Some of those areas have received some support from government and some have not, but they seem to be equally successful. This might tell one that government support was unnecessary rather than it was essential.

2255. But would you agree Government support for R&D is important to the generation of wealth? The companies which have to undertake R&D cannot do it on their own initiative. There are not the profits being generated in British industries to undertake the base R&D which is called for in some industries, and British companies' innovation to some extent is a necessary generator of greater profit and greater progress. When I look at figures of the UK's recent technology performance, the Government support for R&D seems to have stagnated despite the fact this is a necessary dynamic force in industrial and innovative development.

(Mr Lilley) As I say, the evidence is that we spend a higher proportion of our gross domestic product via the Government on civil research and development than do the Japanese. So that level does not seem to be what accounts for the difference in the success of the Japanese economy. We accept there is a need, and we seem to accept it to a greater

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[Continued]

[Lord Taylor of Gryfe *Contd*]

degree than the Japanese do, for Government funded help in research and development. All the evidence suggests that the prime motor for the success of the Japanese and Germans, and most other countries which are successful, is when businesses themselves undertake research, fund it themselves, direct it themselves, choose their own projects and exploit them commercially. The Government can do a certain amount, and there are particular areas where only Government can do things, and we are trying to ensure there is adequate funding for these areas, but we would be mistaken to imagine Government is the prime source of research and development expenditure in most areas, or should be.

*Chairman*

2256. That leads on naturally to our next question. In earlier evidence we had from your Department, it was stated that "the Government recognises that reliance on the decisions of firms may produce inadequate innovation for the maximum benefit of the economy", which does imply there is a need for Government to do something in some circumstances. In what sort of circumstances do you think it is appropriate for Government to support?

(*Mr Lilley*) It is hard to lay down very rigid criteria which determine, "Here you need Government support and here you do not", but three broad criteria are helpful. Firstly, where research is distant from the market, does not have an immediate commercial application, then it is particularly likely that not enough of it will be undertaken and Government should help, and so we do for far-market, collaborative projects where benefits tend to be shared across companies and where therefore also there are not necessarily, without Government aid, enough incentives for the research to be undertaken. We believe that in certain high risk, collaborative projects perhaps the Government should help, and we help there. And perhaps smaller companies often do not have background knowledge and expertise to fund research, and so we give an additional boost to research and development via smaller and medium sized companies. Those are the three areas where we try and concentrate the Government's effort.

Lord Flowers] Secretary of State, would you say a word about the former role of the research requirements boards in all this? They used to be very vigorous at one time; I am not so sure what is going on now.

*Chairman*

2257. I think they have been abandoned altogether now. Industrialists used to sit and give advice on which sort of sectors should be supported.

(*Mr Lilley*) Anything that happened more than three months ago, I will refer to Dr Coleman.

(*Dr Coleman*) It is true we no longer have requirements boards. The purpose of the requirements boards was primarily to help the DTI identify

and support product and process development. Because we no longer do that, we do not need them, but we have an innovation advisory board which looks at the whole of the innovation process and does offer very useful advice to the Department, not only on research and development and technology but on other areas which are important in completing the innovation chain.

*Lord Flowers*

2258. I had always understood the requirements boards did an important job in trying to find out what pre-market R&D would be helpful to a number of firms, jointly, before they reached the competitive stage. How do you try to take account of that activity without the requirements boards?

(*Dr Coleman*) Well, we do have additional advisory boards and many of these boards now advise both the DTI and the Science and Engineering Research Council in the area of information technology, in the area of bio-technology and materials. We have joint advisory boards which give advice over the totality of the R&D support, both in the science base and for collaborative research paid for partially by the DTI.

2259. What is the advantage of that over the old requirements boards?

(*Dr Coleman*) One advantage is that there is now a much better linkage to the research councils.

*Chairman*

2260. Is it not the case that the requirements boards, on which industrialists sat, actually had money with which to provide support for industrial—using your words—product and process development and near market support to make industry more competitive, whereas the advisory boards are purely advisory and do not have any money to back their advice with?

(*Dr Coleman*) The requirements boards were also advisory.

2261. But they also had money.

(*Dr Coleman*) If they are advisory, they do not have money. They advise officials how to spend money.

2262. But, with respect, the requirements boards did have money to allocate. Is that not right?

(*Dr Coleman*) They were not executive.

2263. But they had money to allocate?

(*Dr Coleman*) Clearly not, if they were not executive. They gave advice on how money should be spent.

2264. But in effect they decided how some amount of money allocated for that purpose was spent?



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[Continued

[Chairman Contd]

(Mr Lilley) I am only familiar with this at a distance. They had influence but not executive responsibility.

2265. But they had great influence on making money available for product and process development?

(Mr Lilley) As indeed do the advisors we currently seek advice from, but they do not have the power to say "Yea" and he doeth.

2266. Surely the policy of the Government now is not to support product and process development, except in very rare cases?

(Mr Lilley) In the areas where we do it, we take advice and we value the advice we receive. The one area where we are moving to the sort of development you are talking about is for smaller companies, in the SPUR programme.

2267. We have had quite a lot of witnesses who have said categorically they wished the requirements boards had never been abandoned and they would like to see their return to help industry become more competitive in difficult areas.

(Mr Lilley) It is not at all uncommon for people to regret the departure of sources of funds.

*Lord Whaddon*

2268. I was intrigued by material prepared from the Government's expenditure plans, showing the total expenditure of the Department in 1981-82 was £2.9 billion, in 1988-89 £1.6 billion, and planned for 1990-91 just over £1 billion, which showed a more or less steady reduction in the overall total, whereas the central and miscellaneous services, which are I understand pretty well entirely concerned with the Department's internal costs, steadily increased from £103 million in 1981-82, to £212 million in 1988-89 and an expected £253 million in 1990-91. This shows a percentage increase from 1 per cent of the total ten years ago to 12 per cent last year, going up to 20 per cent in two years' time. Would this not seem to indicate a dramatic decrease in the productivity of the Department?

(Mr Lilley) It might, at first sight. If you look closely, you will see a big reduction in the losses of nationalised industries and a reduction in automatic grant, as I recall.

The much smaller item which has indeed increased, I am not quite sure all the items it includes within it, but it may include some of the laboratories.

2269. These are reductions in expenditure?

(Mr Lilley) The big reductions were reductions in the losses from £1.3bn on aerospace, shipbuilding, steel and vehicle manufactures—and selling Rover and things like that.

2270. The point I am making is that we have seen a steady increase in the internal expenditure—doubled?

(Mr Lilley) It certainly costs very little to hand out large sums of money to loss-making industries.

2271. It costs more not to give it out?

(Mr Lilley) It costs rather more to give targeted grants to specific, positive and constructive uses. We do have to have some infrastructure of officials deciding who should have targetted grants, as Lord Taylor suggested.

2272. You are not worried that the Ministry is spending 20 per cent. of its total economy on its internal affairs?

(Mr Lilley) It is certainly a constant concern of mine to keep current costs and running costs to a minimum. In the coming three year plan we are seeing significant manpower reduction on the running costs total. I was not prepared for this specific question and I do not have a breakdown and I cannot tell you where it is all coming from and going to.

2273. You are expecting to see a decrease in manpower over the next three years?

(Mr Lilley) Of running costs.

2274. According to this they are going up from 212 to 253 millions?

(Mr Lilley) I have not got the future balance here. I am talking about the future three years.

*Chairman*

2275. Is it possible for you to let us have a brief note on that, Secretary of State, rather than worrying you now?

(Mr Lilley) Yes.<sup>1</sup>

2276. I think we are all agreed that it is highly desirable to have greater investment in innovation in manufacturing industry to increase output. Could we ask you, Secretary of State, what do you see as the major barriers to greater investment in innovation in our industry, and how can these be overcome?

(Mr Lilley) The first is financial. When companies are unprofitable they do not have the money or the incentive to invest in research and development. There are also cultural barriers. They are concerned too that there is an over-predominance in British industry of the finance function relative to the engineering, scientific, even marketing and production management functions. As a result I think that influences the awareness of industry of the need for research and development. There can be specific market failures in respect of specific types of research and development. Very large, high risk projects are obviously more difficult to find finance for, and even where large sums are relative to the size

<sup>1</sup>See page 372.

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[Continued]

[Chairman *Contd*]

of the company. The main concern of Government must be to ensure profitability of British industry and that they have that basic incentive to carry out the investment themselves as well as the funds to do it.

2277. The profitability provides the funds, but the figures show over the last seven or eight years companies have become much more profitable but they have reinvested a smaller proportion of those profits in development?

(*Mr Lilley*) There has been a substantial absolute increase in the amount they have spent, which must be a good thing.

*Lord Taylor of Gryfe*

2278. Does it not worry you for the future of British industry that now we see declining profits as we move into a recession? Companies are maintaining dividends despite declining profits, and research and development and reserves which are necessary to finance the future of the companies are regarded as a soft option. Does that worry you?

(*Mr Lilley*) Yes, I have a concern about that which I expressed recently in a speech to the Stock Exchange. I cannot identify any specific reason for this arising from the structure of our capital ownership and our open capital market, although some people have attributed this phenomenon to that. It seems to me more that it may be a self-fulfilling phenomenon, because companies have tended to be reluctant to cut dividends except when things are really awful, but they have not cut dividends until things are really awful and there is accumulated bad news within the company of which investors and shareholders were previously unaware; consequently, the point at which dividend cuts have been made coincided with the release of extremely bad news and everybody has then got the impression that a dividend cut causes the consequent drop in the share price. In fact, a dividend cut made by a company which is fundamentally healthy, but is cutting its dividend because it wishes to maintain its research and development and investment programme, may well be a prudent measure which should not be accompanied by a fall in the share price, and should not therefore render the company vulnerable to takeover or increase its cost of raising capital. We have created a self-fulfilling phenomenon, because nobody does it until these extreme circumstances and everybody therefore imagines that any dividend cut will have these consequences. I hope people are beginning to get the message and realise that there can be priorities greater than maintaining the dividend. It is certainly a paradox that British industry, which by and large is more dependent on equity finance than debt finance compared with some other countries, has greater access to equity finance throughout capital markets. The beauty of equity finance is that you do not have to pay a dividend every year in all

circumstances, whereas with debt financing you do. That we should make equity finance almost as rigid as debt finance is a paradox which need not persist.

2279. One of the things that has emerged in our discussions is the vulnerability of companies, whereas in Germany and elsewhere companies are substantially protected because of the structure of their shareholdings, their finance and so on. Has your Department taken a view as to whether the open market and therefore the vulnerability of companies is inhibiting innovation and development or encouraging it?

(*Mr Lilley*) I did express some views in the same speech, of which I should perhaps submit a copy to the Committee. Again, I do not think an open capital market and the possibility of a market in corporation control itself necessarily has adverse consequences for the level of research and development. The evidence for that is that two industries in which we are outstandingly successful are the pharmaceutical industry and the oil industry. In both industries companies have to expend a lot of money on research and development or exploration expenditure. In both cases it tends to be written off against current year's profits rather than spread over future years. It has an immediately depressing effect on the year's profits, yet that does not seem to have caused any adverse consequences to those two industries; indeed, they are very highly rated by the stock market. There does seem to be, nonetheless, in the market as a whole what I have called a deal culture, where there is an over propensity to make deals and expand by acquisition; and spending a lot of time defending yourself against other people making acquisitions seems to predominate at the expense of the organic growth of the company. That seems to have more to do with culture, which I referred to earlier, the over-development of the finance function of 120,000-odd accountants in this country against 7,000 in Germany and far fewer technologists, engineers and production managers relative to that in some other countries. I do not think it is the capital market structure that causes the problem so much as the cultural forces manifesting themselves through the capital market.

*Chairman*

2280. Would you like to see a change in that culture, so that we put more effort into organic growth through investment?

(*Mr Lilley*) Yes.

*Lord Erroll of Hale*

2281. Do you have any plans for bringing it about, or would you just leave it to individuals and private organisations?

(*Mr Lilley*) I do not think you can bring it about by law. You can obviously try and bring about the fundamental changes which would have cultural consequences that would remove the immediate



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[Continued

[Lord Erroll of Hale *Contd*]

cause. We are trying to encourage the greater output of engineers, technologists and scientists from our institutes of higher education. Within the schools we are insisting through the national curriculum that everybody learns about science and technology rather than having a whole academic ethos which previously tended to have a distaste for anything practical or applied.

However that is a long term process and it takes a generation for people to go through schools and come out and run businesses, but I do not see a quicker way of doing it. We are taking a long term view and this is the exact opposite of people who are always taking short term views.

*Lord Clitheroe*

2282. Do you have a feeling that something which could change the culture would be changes in the fiscal system?

(*Mr Lilley*) No, I do not think we can change the culture by changing taxes very much. You might to a degree but mainly you do it by encouraging people to be more profit-orientated, by having a lower rate of tax on profits, rather than investing, simply for fiscal reasons, to try and avoid paying tax.

*Chairman*

2283. Would you agree that our high interest rates, as many of our witnesses have felt, are a barrier or an obstacle to greater investment in innovation?

(*Mr Lilley*) They are simply a necessary evil if we are to get inflation down. Nobody enjoys having high interest rates, except savers, but we have to attract the savings to enable people to invest rather than financing things in an inflationary way, and that is what high interest rates do. They encourage savings and discourage excessive borrowing.

2284. But they also discourage investment in innovation.

(*Mr Lilley*) Since there is no alternative way of bringing inflation down, we have to have a period of high interest rates until inflation comes down. As inflation comes down, it will be possible for the Chancellor to reduce interest rates.

2285. Accepting the importance of reducing inflation, is there not a real danger that a prolonged period of high interest rates is going to mean less investment, as I think you agreed, in innovation? And when we come out of that period and start reducing interest rates to allow the economy to grow, there will be a smaller industrial base from which to grow, and a less competitive one, because of the lack of investment in innovation?

(*Mr Lilley*) I seem to remember being taught there is only a problem if there is an alternative. If there is no alternative, there is no problem. We have to have a period of high interest rates because we

have to get inflation down. The sooner it comes down, the better. If we kid ourselves there is an alternative or any way of avoiding this --

*Lord Flowers*

2286. Without wishing to quarrel with that statement at all, one can still make an exception for innovation in industry, for the reasons which our Chairman has spelt out. You could have a system of grants for innovation in industry which make a little easier the effect of high interest rates on that process of innovation.

(*Mr Lilley*) Well, you could, but you would find it impossible to tell whether the money was really going into that particular aspect of each firm's activities. If you make a loan for research and development, you cannot tell whether all they are doing is borrowing money. Supposing they would have spent £10 million on research and development anyway, they could borrow £10 million against that expenditure at a cheap rate and use it on something else. All you are doing is creating an avenue of cheap finance in the economy, when unfortunately it is necessary for money to be dear. You cannot be sure it has any additionality on research and development.

*Chairman*

2287. So you feel we have to grin and bear it, irrespective of the grave damage which is being done to industrial development?

(*Mr Lilley*) I do not believe that any country has ever succeeded in getting inflation down without enduring a period of high interest rates and some pain. That, if you like, means I have to grin and bear it. We have to recognise our interest rates are higher in absolute terms and they are also high in real terms, but other countries have high interest rates and what it means is that companies' prices are going up by x per cent and the interest rate is x plus the real interest rate.

2288. But would you agree it is a very serious and worrying problem? If, as you say, there is no alternative and we have to grin and bear it, you do at least recognise the problems?

(*Mr Lilley*) Yes, I would, but I think it is up to management to get their priorities right and recognise that we are going through a short term problem of getting inflation down. Investment and research and development are for the long term and it would be extremely unwise for anybody to sacrifice their long term prosperity, namely their investment, because of short term problems.

2289. Could we pass on to the next question. Would you be able to give us some help on the details of your proposed programmes for single-company support for small and medium sized enterprises? What sort of factors would determine this?

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(Mr Lilley) There are three new schemes collectively worth £30 million over the next three years, and they are all designed to help small and medium sized businesses obtain the best technology and apply it to their products and processes. The first is known as SPUR, support for products under research, and will provide grants for single-company new product and process developments which demonstrate a significant technological advance for the industry or sector concerned. The second is MPI, manufacturing planning and implementation studies programme, which again is designed to help small and medium sized companies pay for, in this case, external experts. The experts will work with the companies to identify and plan their use of advanced manufacturing technologies. The third is the Regional Technology Experts Scheme which will pump-prime the regional technology centres as one-stop shops to provide quick technical advice to firms. The regional technology centres will use universities, polytechnics and larger firms to provide this advice to smaller firms who may not otherwise be aware of where to locate this sort of advice. The detailed conditions for each of the schemes have yet to be hammered out with the Treasury and I would prefer not to pre-empt the launch of these schemes by anticipating the number of successful applicants for them. I also have to go through a process of agreeing them with the EC.

Lord Flowers

2290. In your answer to my previous question you said you could not give grants to industry because of the necessity for a high interest rates policy to bring inflation down, but it appears you do give grants, or are preparing to give grants, at least to SMEs to help them over this particularly difficult time. So there is an alternative to what you said, you are practising it yourself, it seems.

(Mr Lilley) We can do it on a limited scale but what we cannot do is give automatic grants for research and development for industry.

2291. Nobody would suggest automatic grants, but on a selective basis such as that practised by your own Department?

(Mr Lilley) You would be surprised what people would suggest. Indeed we used to have automatic grants for investment. The objective of these schemes, and other schemes like them which we have also been operating for a number of years, is clearly to try and finance additional expenditure, and that is one reason why one has to have a vetting process and the overheads which were earlier criticised. If one is going to do it on a massive scale, that is going to have a predominant effect on the level of research and development across industry as a whole, and you will have to have a massive bureaucracy to implement it. These are fairly closely targeted schemes.

2292. If you find the SME scheme is very successful and if high interest rates are to continue, which they seem likely to do for a while, would you be prepared to consider extending this on a targeted basis?

(Mr Lilley) I do not think the scheme is particularly seen as an antidote to high interest rates. I am talking here of the SPUR scheme in particular, which is designed to encourage small and medium sized companies to undertake development of new products and processes. We believe that for cultural and other reasons, and dissemination of information being costly and inadequate particularly among smaller firms, there is a case for some such help. But it is not particularly related to the present level of interest rates.

2293. No, but the present level of interest rates makes it difficult for firms to innovate, so I am asking not about interest rates but firms innovating.

(Mr Lilley) We will evaluate and learn from our experience.

Chairman

2294. On our visits to Italy and Germany we were very impressed when we went to the big factories to find that 90 per cent. or more of the capital plant was made in Italy or Germany. There was one particular plant we visited in Italy where 95 per cent. of the plant there was very high quality, and the up-to-date automatic lines and robots and automatic assembly and the like were made in Italy. If you go into a similar type of British factory you will find a large proportion almost always made abroad. Do you think there is a case for doing the sort of product and process development aid, that you are doing for the SMEs, in that field of capital goods where we have got behind, and it is a very important field?

(Mr Lilley) Yes, it is an important field. It is a field where there is growing international two-way trade, and specialisation in different types of capitalisation. I do not think you can say even Germany makes all its own capital goods, or Italy makes all its own capital goods. I think you will find there is immense trade across countries. Our exports of such goods have been increasing quite rapidly. I certainly would not expect the Government or Ministers, or even my extremely talented officials, to be able to set up new industries to fill gaps that one identifies from trade statistics in that way. I think it is up to businesses themselves to capture new markets and recapture old ones.

2295. It is very difficult when a company or an industry has gone down and has relatively small orders: where does it get its cash flow from to re-invest and emerge again as a profitable, successful company without some external aid, the kind of aid given in other countries?

(Mr Lilley) I do not think in most cases those other countries reached where they were as a result



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of government funding. We have seen a major industry in this country run down despite the billions of pounds which we saw earlier being pumped into it—the motor car industry. It is now heading back up again, thank heavens, but that is due both to the attraction of foreign investment to this country, because we have provided the right climate for it, and also the firms, which were already indigenous, have been transformed; not least Rover having been returned to the private sector is now on the up and up, we hope. It is not because Government has suddenly said, “We’ll allocate so much money to you”. The private investment in turn creates market opportunities for suppliers of machine tools, parts and components.

2296. If you take, for example, the steel industry, that was right down and uncompetitive; the Government put in large sums of money before it was privatised, and it is now one of the most efficient steel producers in the world and has a splendid export level. That would probably never have happened if large sums of money were not put in for pump-priming and re-equipping.

(Mr Lilley) I am not so sure that it was large sums of money for pump-priming. We did have to bear the burden of its losses during the loss-making phase, but I think it was, above all, the fact that it was targeted for and indeed targeted itself for privatisation which gave it a new spirit and direction, and that they realised they had to invest in their own future and they did so.

2297. Money was put in before it was privatised.

(Mr Lilley) And it goes on being put in after privatisation from the capital markets and re-invested profits.

2298. I do think this is a very fine example of an industry being almost down and out and being revitalised by pump-priming from Government and now being very successful. Is there not something to be learned from that?

(Mr Lilley) I seem to recall at the time they did not think of it as money being pumped into them, but they thought they were put under the most severe financial constraints by Government and told to make themselves profitable. The idea that they were suddenly given a chequebook and with the help of that they invested a lot and made themselves more efficient is not quite how it appeared at the time to them.

Lord Taylor of Gryfe

2299. The fact is you have changed management, we are talking about management skills to make companies successful rather than pouring money into them. Do you take a view of management efficiency and efficiency of business schools and training of new management, is that not an area that worries you? Most of the examples we

have talked about have suffered not simply from the climate of nationalised industry but also perhaps from the limitations that are on management skills. The Rover company and even now the Jaguar company has changed as a result of a takeover. Does the management skill and training in this country measure up?

(Mr Lilley) I think management skills are important. They are learned partly through the school of experience, and partly by study. We welcome the fact that companies do increasingly recognise the need to upgrade their skills by study as well as experience. What was most debilitating to British industry was when it was not allowed to manage itself at all and, therefore, did not learn how to do so when the principal decisions on prices, pay, dividends and exchange controls were taken out of its hands, and the principal skill required, certainly in big business, in this country was political skills with access to government and officialdom. We have moved back a step in most respects from business and consequently management have learned how to manage. There has been an improvement in the quality of management in British industry. We are not saying it has reached anything like perfection, there is a long, long way to go, but it is primarily by its own efforts that it will improve its calibre. We do have to have business schools; although I note that Germany does not have any, and there are something like 27 MBAs in Germany (they are a very, very rare breed). But somehow German managers seem, as the result of staying at university for an incredibly long time getting doctorates, to end up as extremely competent managers.

Chairman

2300. We were very impressed in Germany, when we visited, by the effectiveness of aid to industry, the support to industry, given by the Länder. Do you think there is a case that we should use regional support more widely than we do at the moment?

(Mr Lilley) We do have a number of regionally orientated modes of assistance. We have 13 regional technology centres established with Government support throughout Great Britain, and they provide technical information and expertise for smaller firms drawing on universities, polytechnics and larger firms. Funding is also available through the DTI Regional Office Technology Transfer Programme to improve competitiveness of smaller firms in regions by promoting wider and better use of modern technology. Finally, we have regional enterprise grants for innovation, which give extra encouragement to those firms with less than 25 employees in development areas. Small firms also benefit from the consultancy assistance under the enterprise initiative for technology based projects and that has a higher rate of grant in development areas.

2301. By and large you think we are doing all we practically can in that area?



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(Mr Lilley) Yes.

*Lord Taylor of Gryfe*

2302. If you look at the regional issue, I agree with the Minister that you do not create jobs by throwing money at them and giving automatic grants, but the decline in regional assistance from £1.1bn in 1981-82 to £294m in 1990-91 is a pretty dramatic fall. How often do you review the effectiveness of the great variety (and you have just listed some) of instruments of support and encouragement? How often do you view their effectiveness, as you would do in a business?

(Mr Lilley) Very systematically and effectively. Each scheme tends, when it is introduced, to have systematic reviews built into it, often using outside consultants to evaluate the performance of that scheme. In the case of the sums you referred to, the big decline is due to the phasing out of the regional development grant by my predecessor but one, and that was virtually an automatic grant. What is significant is that the vast expenditures in the past did not seem to have a great impact on regional disparities. What has been clear in this slowdown in demand business cycle, call it what you will, that we are going through now, is that the regional disparity is probably less than ever before. The further north I go, when I go to Scotland if you mention the word "recession" they think you are referring to some dim and distant time in 1981, and you have to explain you are referring to the south-east of England.

In the past, slow-downs seem to be accentuated in the manufacturing and regional economies. This time, rightly, the burden, because we are relying on interest rates, falls on the most over-borrowed areas of the country, which tend to be the south east and areas where the housing boom was greatest. So at least there is some silver lining to the shadow of high interest rates, that although painful for individuals and companies at least they are targeted on the areas where over-borrowing was most excessive.

*Chairman*

2303. We have noted that in the aerospace sector there is a very favourable balance of overseas trade and also there is a substantial element of launch aid by Government, so it does seem *prima facie* there is a good case that kind of launch aid is very effective in helping an industry to be more attractive and get a better share of world trade. Should that not be extended wider than the aerospace industry?

(Mr Lilley) There are unique characteristics in the aerospace industry. Huge costs and very long time scales are two. The fact is there is a very small number of manufacturers and therefore the risk of monopoly in foreign supplies develops if there were no support at all for the British industry. But obviously the success of the British industry is owed to a lot of things apart from launch aid, important though that has been to specific projects. I do not see there is any analogy in any other business.

2304. Because of the long term characteristic?

(Mr Lilley) Given those three features—the very large sums, the very long time horizon and the danger of international monopoly if we did not maintain a British and European capacity.

2305. There are three broad elements in the aerospace industry, the air frame, the engine and the equipment. You give substantial launch aid to the engine and air frame manufacturers, do you give similar launch aid to the equipment manufacturers?

(Mr Lilley) Not in general, no.

*Lord Erroll of Hale*

2306. As that amounts to about one-third of the total cost of the project, would you not be advised to extend it, even if you reduced the amount already given to frames and engines? It seems unreasonable to expect a company to find all the costs of developing undercarriages and the more sophisticated equipment which goes inside a plane, while the engine makers and the air frame makers get launch aid. It is a real handicap in their innovative development work to be denied launch aid when other parts of the industry get it.

(Mr Lilley) It is true that whenever you have such a scheme, people want to extend it.

2307. I am not suggesting you extend it but give less to those who already get it. The same total expenditure but spread across the aircraft as a whole rather than favour two-thirds of it.

(Mr Lilley) Inevitably we do not give more than we feel we need to, so it is not as if there is surplus cash represented by the grant that we have given, or at least there was not when we gave it, otherwise we would give them less in the first place. So I do not think you can assume it is available; any extra money would be extra money.

2308. But in view of the success of the whole scheme perhaps it might be worthwhile getting more?

(Mr Lilley) The success is that we have a proper indigenous aerospace industry and there are industrial spin-offs for all the different equipment suppliers. If one simply says out of fairness that all these suppliers should have access to launch aid, there is an endless progression. The strategic argument would be to say the launch aid for the major products ensures the industry is here and that creates a market for the equipment suppliers to supply.

*Chairman*

2309. We regard innovation as having many stages, from research, design, development, right through to the marketing of a product, but the Government seem to have withdrawn further and further from the market place. Do you think, on



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reflection, it is the right policy, in view of the importance of exploiting knowledge, which you mentioned earlier?

(Mr Lilley) I think exploiting knowledge and putting it to commercial use is enormously important, but I think it is primarily, and ought to be primarily, the obligation of companies to finance that research and carry it out. They are best placed to know when it is necessary and do it when it is necessary. We have accepted, if you like, some deviation from the doctrine that it is purely collaborative, far from market, research which the Government support, in introducing the SPUR programme to help single company, near-market product development by smaller companies, because of the particular problems smaller companies have and the particular need to overcome the cultural antipathy which tends to be prevalent in this country towards research and development at that level.

Lord Flowers

2310. If you are talking about R&D, you are talking about a fair sized firm before you start, because a small firm really cannot afford to employ the sort of people who can do R&D anyway.

(Mr Lilley) We are talking, in the case of SPUR, of comparatively small companies. SMART is for even smaller companies.

(Dr Hicks) SPUR is still under discussion, the actual level, but it would be expected to be several hundreds of employees, without wanting to be drawn any further.

(Mr Lilley) SPUR will be for small and medium sized companies, and SMART is for very small companies. Even with SMART (less than 50 employees) there are companies of that size who do undertake specific development projects related to specific projects they wish to reach in the market. If you look historically, quite small firms have developed new products and then gone on to become medium and big companies. Indeed the whole purpose of the SPUR programme is based on the recognition there is not enough R&D done by small and medium sized companies but it should be encouraged and it is possible for them to do so.

Baroness Platt of Writtle

2311. Have you looked at the reverse way of doing it, at fiscal allowances on expenditure?

(Mr Lilley) We have, and you probably know there was a report produced in 1987 and also a paper the Inland Revenue has just submitted to you. Scientific expenditure is one area (out of only two)<sup>1</sup> where a 100 per cent capital allowance is retained under our tax system. It is inherent in the tax system that a current spending deficit is written off against current profits. Scientific expenditure on capital is an

allowable expenditure in the tax system and does not have to be depreciated at 25 per cent of the declining balance, as you do with other capital.

Chairman

2312. Is there a distinction then between capital spent for scientific research and capital spent for development of a new product?

(Mr Lilley) Yes.

2313. Is that wise? Surely the development is much more expensive, the equipment is more expensive, and it is much more important because it is making use of the scientific knowledge and making products for the market?

(Mr Lilley) Well, that is the cut-off point which has been established in the tax system.

2314. Would it not be a good thing to make it applicable to capital as a whole?

(Mr Lilley) Clearly the nearer you are to the process of development, the less uncertain it is and the less detached the investment is from the benefits which are soon to flow from it, and therefore the more appropriate it is to depreciate that investment over the life of the product concerned.

The general view when we made the changes in 1984 was it was better to have a low rate of tax and a widely spread tax base rather than a high rate of tax and lots of allowances.

2315. The problem is that the tendency has been for companies to use that money for other purposes, to save on tax, rather than to put it into research and development. If you only give fiscal help for specific development capital then you know where the money has gone.

(Mr Lilley) There does seem to have been quite a substantial rise in expenditure on research and development since 1984.

2316. Could we pass on to this very topical problem of short-termism. Could you tell us whether you agree with the Innovation Advisory Board's view that short-termism really is a problem, and what do you feel about the Board's proposed solutions?

(Mr Lilley) As I have mentioned before, I have spoken on this at some length to the Stock Exchange and will give you a copy of my speech. I there concluded that though a lot of the arguments that are often brought to bear on the short-termism front are bogus, there are at least two areas where I thought there was a case to be refuted. One was on the area of the tendency of companies to maintain dividends even at the expense of innovative investment, rather than vice-versa. The other was the deal culture at the expense of organic growth. There are clearly other areas where there is scope for criticism of the relations between industry and the City. I very much agree with the measures that the

<sup>1</sup>The other exception is industrial and commercial buildings in Enterprise Zones.

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Innovation Advisory Board are proposing to encourage better communication between companies and those in the City to make sure that they are talking the same language, and that companies, when they are making long-term investments of this kind, communicate what they are doing to investors and appraise investors of the long-term worth of what is being undertaken. I used to be in that world and I do not think it is at all difficult to get that message over if one puts it over systematically. The other thing I would always urge companies to do is not to treat the City with too much reverence.

*Lord Taylor of Gryfe*

2317. I quoted at our last meeting the classic case of the contested Pilkington takeover, in which this company had spent a large amount of money on research on the float glass process, and the predator in that case, Owen Green, said, "We have never seen the ethical need or material need for placing research and development in the forefront of our activities. Research does not seem to fit easily into the cut and thrust environment of industry and commerce."

(*Mr Lilley*) I recall his bid failed.

2318. Just marginally. It is rather frightening, that kind of view would succeed because of the interests of short-term return of investment managers.

*Chairman*

2319. It is a very interesting example, because I think it is generally agreed that if BTR had made their bid, say, two years before when Pilkingtons were investing heavily but could not say for certain that it was going to be successful the bid would have succeeded. They were able, when the bid was made, to say, "Our development is almost complete and the profits will flow through next year", and they did. That is how they avoided it. It would have been a bad thing, would it not, if a conglomerate had taken over a very competent and efficient specialist manufacturer in the glass field?

(*Mr Lilley*) I do not think we can take your hypothesis as fact of what would have happened had something occurred two years earlier. I do not know what would have happened if something had occurred two years earlier. All I know is that in the case of our pharmaceutical companies they do spend large sums every year on research and development; that does not show through to the next year but takes quite a long time to come through and, nonetheless, they are extremely successful industrially and popular in the City. It is possible they have communicated a message to investors that what they are doing is a good thing and shows up ultimately in the share price or dividends for them to carry their investors with them and not be the subject of constant predatory takeover.

2320. They tend to be pretty large companies in the pharmaceutical field.

(*Mr Lilley*) If you are successful for a long time you do become a big company.

2321. That is why they are less easy to take over.

(*Mr Lilley*) I do not think that gives any company immunity nowadays.

2322. On short-termism you feel there is a problem but that we are making progress to tackle it but it needs working on further?

(*Mr Lilley*) Yes, there are a number of bogus problems. There are at least two possibly genuine problems, and there are concrete steps which need to be taken to improve communications between industry and the City. Indeed, welcome steps have been taken following the IAB report and other reports, to move in that direction.

*Lord Whaddon*

2323. The view has been expressed that the City itself is not very well equipped in expertise, that they are lacking in technical experts in many of their institutions. How do you feel about that?

(*Mr Lilley*) I come across conflicting arguments. When I visit manufacturers and ask them do they have any problem getting engineers, they say we are not producing enough engineers from our universities. I say, "Yes, we are", but they say, "Ah, but they are all being attracted into the City". They presumably do constitute expertise of a kind when they get to the City. On the other hand, I hear the criticism that these teenage scribblers in the City do not know anything about engineering and are all arts graduates and PPE graduates. I was a scribbler for a while and have a scientific qualification and an economic qualification. I think we pay far too much attention to analysts and should pay more attention to companies.

*Chairman*

2324. Since only about 5 per cent. of world R&D is carried out in the United Kingdom, do you feel that your Department's overseas technological information retrieval service is adequate to support industry with knowledge based on needs in that respect?

(*Mr Lilley*) The scope for Government to act directly as the supplier of technological information is limited, and it is not appropriate for it to try to meet the specific needs of individual companies. Its role is rather to raise the awareness of the value of overseas technology and technological information in UK industry, and there is a wide range of DTI and Community policies to do just that and promote inward technology transfer in one way or another. Examples are, schemes to promote collaborative R&D, such as EUREKA and the EC Framework Programme. Small and medium size enterprises are actively encouraged to take part in those. There are



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also three individual DTI schemes to promote inward technology transfer as their main objective, and these include the Overseas Science and Technology Expert Mission Scheme, which enables groups of industrialists to visit countries such as Japan to learn from the state of the art technology and practice there. On the European front, the Department actively encourage UK technology organisations, like regional technology centres and research and technology organisations, to participate in the European Commission's strategic programme in innovation and technology transfer, SPRINT, where we have had a very high success rate compared with our partners in Europe.

2325. You broadly feel we are doing enough in this field?

(Mr Lilley) Yes. We review every programme we undertake from time to time to ensure that it is achieving its objectives.

2326. Perhaps we can then pass on to the capital allowances point, which we have already touched on. Several of the witnesses have felt that it would be of great advantage if we could go back to variable amortisation instead of the compulsory 25 per cent. diminishing balance. We have had a paper from Inland Revenue on this. Would you like to see, from the point of view of encouraging industry to invest, a return to the old system?

(Mr Lilley) No, I would not. First of all, one should remember that the change involved a progressive reduction in the rate of tax from 52 per cent. to 35 per cent. and the *quid pro quo* was moving from 100 per cent. allowances to 25 per cent. declining balance allowances. Most people want to keep the 35 per cent. rate but revert to the higher level of allowances. That is understandable but it is not on and they are less enthusiastic if you say it means going back to a 52 per cent. rate of tax. But in any case, the 100 per cent. allowances did encourage—and I think this was, universally recognised at the time—investment for fiscal rather than industrial reasons. Businessmen used to spend an enormous amount of time thinking at the behest of their finance director, not their production managers, what can I invest before 6 April to use up my allowances. That led to the wrong sort of investment and essentially the wrong sort of management. Since the change we have seen investment being much more orientated towards the productive needs of a company rather than the whims of the finance director, and that is a much better thing.

2327. A witness did comment that the LINK programme, although "splendid in conception" has been "stifled by bureaucracy". In other words, this was a general point that has been made on other subjects, that the schemes are very often excellent in

concept but there is an awful lot of "red tape" and work needed to get them effective in the companies concerned. Would you like to comment on that?

(Mr Lilley) Indeed. On the first part, that it is splendid in conception, I entirely agree and it goes right to the heart of what I was saying in my opening remarks about the absolute importance of our exploiting the very substantial investment we have in the country's science base and the enormous expertise of our scientists in the academic world. That is what this whole LINK programme is designed to do. That does not mean to say it is perfect in execution. We have agreed that external consultants should undertake a review of LINK and, with their help, we should be able to improve the management and programme and, above all, speed up the process by which projects get approved. I am determined that we should get it right. We have already introduced one change to include the possibility that single companies collaborating with the science base should be eligible for grants under the LINK scheme. But obviously the consultants may come up with other proposals to improve its working and I would welcome any constructive suggestions that they or, indeed, the Committee have.

Lord Flowers

2328. Could you say a word about the timescale of that inquiry by the consultants?

(Mr Lilley) It is due to report at the end of the year, so it is quite a speedy exercise, I hope.

Chairman

2329. Secretary of State, we have touched once or twice during our discussion today on the importance of manpower and more engineers being produced. Can you give us any help as to when the ACOST report on this is going to be published? I believe it has been completed and is in the hands of Ministers. We have not made a detailed study of manpower in our discussions because we believed that ACOST was doing it but, on the other hand, it is clearly a very important issue.

(Mr Lilley) The whispering beside me lets me know that the report has been finished and is either about to be or has been sent to the Prime Minister, but it is a matter for the Prime Minister as to when it is published, I believe. I imagine it would be a very high priority, or I hope it would at any rate.

2330. If you can do anything to help its being published fairly quickly it would be an enormous help to us because we know from all the evidence that we have had and from other directions how important the supply of properly trained manpower is. On the other hand, it does appear that if it is already being studied there is no point in our doing it too but we would like to make some comments on it in our report.



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(Mr Lilley) That is a good point and it is an extremely important subject which genuinely is a matter, I know, of personal priority to the new Prime Minister, so I will draw it to his attention.<sup>1</sup>

2331. Thank you very much. The other point I would like to ask you is this. I noticed in Germany during our visits and discussions how relatively easy it is to transfer between the academic world and the industrial world on the technological side—engineers, scientists and the like. I believe we ought to do more here. Would you share that view and what can we do to facilitate that? It is a very good way of technology transfer through people.

(Mr Lilley) Absolutely right. We do have a programme, the teaching company scheme, which is designed to give young academics a period of experience in business and industry and that is very desirable in itself.

2332. But it is not quite the same as transfer?

(Mr Lilley) There is another scheme that enables teachers to spend a period in business but not related particularly to their academic expertise, and that is large-scale and voluntarily carried out by business. So on both fronts I think it is very important that people should have this transfer across and it is a strange aspect of British society that we do have these divisions. We hear a lot about class divisions but it is these functional divisions which are so strange in our society.

Lord Whaddon

2333. One small hobby-horse, since we have time. I have always been impressed by the success of COSIRA, the Council for Small Industries in Rural Areas, in bringing voluntary help and technology and business expertise to specific areas. They have, as you probably know, a committee in each county, who are not paid, of course; it is voluntary. I have often wondered why on earth do we not try it in towns, a so-called "COSURBA". As far as I know it has never even been tried as a way of bringing scientific and engineering and commercial skills very directly to bear for small industries in specific areas, free.

(Mr Lilley) I gather that Business in the Community has similar characteristics and tries to do in towns and cities what you are saying is done in the rural areas.

<sup>1</sup>ACOST are not, now, expected to finalise the report imminently.

2334. I was not aware that it had anything like the same structure.

(Mr Lilley) Probably not.

Lord Whaddon] But if the one in the country works, it is worth trying.

Chairman

2335. Would any Member like to ask the Secretary of State any further questions that we have not dealt with or elucidate anything that has been said? Secretary of State, would you like to say anything further as a closing remark?

(Mr Lilley) Only to say, as I mentioned in my opening remarks, that I am planning to try and tap the expertise of people in the academic world and the business world to see what more can be done to try and bridge this gap between the two. I do have a lot of demands for my Department to spend more money and I am always prepared to consider them constructively, but we are as a nation spending billions of pounds in the science base and I want to make sure that we are getting the full benefit of that commercially. There must be further steps we can take, which themselves may end up spending some money, but are much more likely to involve cross-fertilisation. I am very much open to ideas on this front and any which your Committee produces I would very much welcome. Indeed, I know you comprise within yourselves both sides of the divide and I am glad you bring them together. I want to bring them together on a wider scale nationally.

Lord Flowers] If I may say so, I think one of the more important ingredients of this is not to try to bring people together after the event but to try to get people from both sides working together in the same laboratory right at the beginning of a study if there is any likelihood at all of any research project being of use to somebody, trying to get somebody in on it at the beginning. It is difficult today because British industry feels it is so hard-pressed that it cannot do that until it is fairly sure that it is going to be useful and then it is too late. I suspect that that is part of the problem, not all of it, no doubt, but part of it.

Chairman

2336. Secretary of State, thank you very much for answering our questions both so well and so very succinctly. We are most grateful to you for spending the time with us and I hope you have found it as useful as I know we have. If you could let us have a copy of your speech that would also be helpful.

(Mr Lilley) I will.

Chairman] Thank you very much.



28 November 1990]

[Continued]

### Letter from the Department of Trade and Industry

When the Secretary of State gave evidence to the Committee on 28 November he undertook to provide a brief note on the Department's Central and Miscellaneous Services expenditure. Our Finance and Resource Management Division have now examined this expenditure line in order to explain the origin of the increases referred to by Lord Whaddon's question (Q 2268).

The figures given in the Government Expenditure Plans 1990 for the Central and Miscellaneous Services expenditure are:

84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93
			outturn	estimate	plans			
162	156	165	169	212	271	288	270	280

Figures before 1984-85 are not comparable with the figures above as the definition of what running costs were included under this expenditure line changed in 1984. The figure of £271 million given for 1989-90 was an estimate, the final outturn is likely to be significantly lower.

The step increase in the years following 1987-88 is mainly due to rises in the Capital component of the Central and Miscellaneous Services expenditure. Capital expenditure increases chiefly arise from the Department's ongoing strategy for relocation out of central London, e.g., the Patent Office moved to South Wales and the Laboratory of the Government Chemist has moved to Teddington, Middlesex. In addition, computerisation of the Department has contributed to the step rise since 1987-88.

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